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The Art of Perfumery in India.—II.

We promised in our previous issue to give a list of perfumes and perfume yielding substances, which were or are utilized in India, so we herewith give it for the consideration of our thoughtful readers. It will be seen that almost all of the raw materials can be obtained in India and yet we go to the foreigners for our toilet preparations. It is a pity and shame indeed. India, the home of sweet smelling flowers, can boast of her flowery realm, and if justly utilized she can supply the whole world with her perfume, Indeed, which country under the sun can boast of such sweet smelling flowers as jasmine, "the queen of flowers," bakul, the favoured flower of Sreekrishna, aguru, the perfume of the Gods, champa, ketaki, and a host of others? Like other tastes, our olfactory nerves seem to have undergone a complete change. Alas, we have lost the power of judging good scents also.

The following are the chief perfumes and perfume yielding substances, which can be or are utilized by our perfumers :—

Abir.—A perfumed powder which is mixed with the red *gulal* and used at the *Holi* Festival. For an account of the various kinds of Abir used in different parts of India the reader is referred to page 70 of June 1913 issue of Industry.

Acacia Farnesiana, *Willd.*—The Cassie flowers. The round yellow flower heads are much used in perfumery. See an account on page 199 of November 1913 issue of Industry.

Acorus Calamus, *Linn.*—The sweet Flag. The leaves and rhizomes, yield by distillation, an essential oil, which is much used by European perfumers. The colour of the pale to dark yellow.

Ægle Marmelos, *Corr.*—The Bael or Bel Fruit tree. The flowers yield by distillation, a fragrant essential oil, which has not yet drawn the attention of perfumers which it deserves.

Alosia Citriodora.—Some part of this plant is utilized in perfumery.

Andropogon, *Linn.*—25 species are met with in India. A. citratus is the lemon-grass. It yields lemongrass oil, Verbena oil, or Indian *molissa* oil. This oil is chiefly used in adulterating true verbena oil. It is largely employed to perfume soaps and greases, and enters into the composition of Eau-de-cologne. When pure it is a pale sherry colour, transparent, with an extremely pungent taste, and a peculiar fragrant lemon like odour. A. muricatus, Retz. It is the khus khus grass. The roots, when distilled with water, yield a fragrant oil, which is

used as a perfume. Dr. Irvine, in his *Medical Topography of Ajmeer*, mentions the preparation of attar from the roots of this plant, which he says is used in sherbert. A. Nardus, *Linn*, is the citronella. The leaves are distilled with water, and yield over 3 ozs., of essential oil from 1 cw. The pure oil is thin and colourless, with a strong aromatic odour, and an acrid, citron like flavour. It is largely used to give the peculiar flavour to what is known as honey-soap. A. schoenanthus, *Linn.* is the Geranium grass. It yields the Rusa oil or oil of Ginger grass. It is used to adulterate the true geranium oil, which in its turn is used as an adulterant for otto of roses. Dr. Dymock states that 373 lbs. of grass, submitted to distillation with water, yielded 1 lb. 5½ ozs. of oil.

ANETHUM SOWA, *Kurz*.—It yields by distillation with water from 3 to 4 p. c. of an essential oil known as oil of Dill or "Bishop's weed oil." It has a pale yellow colour, a pungent odour, and a hot sweetish taste. It is much used for perfuming soaps.

ANISOMELES MALABARICA, *R. Br.*—Ainslie tells us that the leaves yield by distillation with water an essential oil which is largely used.

ANTHEMIS NOBILIS, *Linn.*—It is the common o true chamomile. The flowers yield about 15 p. c. of essential oil, first of a pale blue colour, becoming yellowish brown in the course of a few months. It is much used in perfuming soaps.

AQUILARIA AGALLOCHA, *Roxb.*—It is the much prized Aguru. The wood chips are largely sold in the bazars, and used either by themselves or associated with *Bdellium*, as incense burned at temples. They are also [illegible]d, and the water thereafter distilled [illegible] to prepare Agaru-atar, a perfume which has been utilized by the Bengal Chemical & Pharmaceutical Works, Ltd., of Calcutta, and is a much prized perfume now-a-days.

ARTABOTRYS ODORATISSIMUS, *R. Br.*—The flowers yield, by distillation with water, an essential oil which has a smell like that of the otto of ylang-ylang.

ARNEBIA GRIFFITHII, *Boiss.*—This species is said by Dr. Forbes Watson to be used in perfumery in the Punjab, where it is known as *Paijhamberi-phul*, *sparhi-gul* or *mumanuie*.

ARTEMISIA VULGARIS, *Linn.*—Is the Indian Woom-wood or Fleabane. What part of this plant was used in ancient perfumery is unknown. But it is now used to prevent moths and other insects from infesting clothes and furniture.

Balsamodendron, *Kunth*.—Ten species are met with in India, which yield the myrrhs, bdeliums, and gum gugul of commerce. The two first are largely used in oriental perfumery. B. Berryi, *Arnott*, is very fragrant and yields a gum resin. B. Mukul, *Hook.*—This yields the gum resin known as *gugul* or as an *Indian Bdellium*. B. myrrha, *Nees*, yields the well-known myrrh. B. opobalsamum, *Kunth*, yields the famous Balm of Gilead or Balsam of Mecca. It is a greenish yellow oleoresin of the consistence of honey, used as a perfume and in medicine.

Blumea, *D.C.*—This genus consists about 60 species. B. Balsamifera and B. Densiflora yield camphor. For an account of both of them the reader is referred to the article on camphor on page 169 of Oct. 1913 issue of Industry.

Boswellia, *Roxb.*—This genus contains about six species only. B. carterii, *Birdw.* includes 2 forms. B. Frereana, *Birdw.* yields

the fragrant resin sold as *Luban Meyeti* or *Lubanm iti.* B. Serrata, *Roxb.*—It is called the Indian olibanum tree.

Calophyllum Inophyllum.—It is the alexandrian laurel. The decorticated seeds, when expressed, yield 60 p. c. of a fragrant oil. Its colour varies from greenish yellow to deep green. It is known as oil of sultan champa.

Cananga Odorata.—It is the Ilang Ilang of European perfumers. It is one of the most valuable and highly prized of Indian perfumes. The flowers when distilled with water, yield the otto of Ilang. It fetches ... per ounce in Europe. It ... blended with pimento, orris, rose, tuberose, and jasmine in the preparation of handkerchief scents.

Carum Carui, *Linn.*—Its seed, when distilled, yields the oil of caraway. It is colourless or pale yellow thin, with strong odour of the fruit. It is used in the manufacture of cheap essences and as a perfume for soaps.

Carum Copticum, *Benth.*—It is the Bishop's weed, or Ajwain. The fruit affords ... volatile oil which, on evaporation, ... a stereoptene, sold as a perfume ... Western India, under the name of *ajwain ka-phul.*

Caryophyllus aromaticus, *Linn.*—The flower buds, when distilled with water, yield a colourless or yellowish oil known as oil of cloves. The oil is extensively utilized in perfumery. It easily combines with grease, soap, and spirit. It is often adulterated with carbolic acid.

Chrysanthemum Coronarium, *Linn.*—The fragrant flowers yield by distillation a perfume called ..., which is much prized in Indian perfumery.

Cinnamomum camphora, *Nees.*—This is the plant from which the Japan camphor of commerce is obtained. Consult the article on camphor in Oct. 1913 issue of Industry.

Cinn. Glanduliferum, *Miessn.*—The plant yields the famous Nepal camphor.

Cinn. Iners is the wild cinnamon.—The bark yields by distillation an inferior quality of oil of cinnamon.

Cinn. Tamala.—The leaves, when distilled, yield a very fragrant oil, which may be utilized in perfumery.

Cinn. Zeylanicum, *Bryn.*—It is the common cinnamon of commerce. The bark, when reduced to powder, and submitted to distillation, as is done in Ceylon, yield the oil of cinnamon, which is much utilized in perfumery.

Citrus Aurantium, *Linn.*, Vars. Aurantium proper, and Bigaradia.—These yield the otto or oil of Neroli of European commerce. As the orange tree yields three different perfumes it would be better to be a little careful when purchasing them; the leaves yield by distillation the oil of *petit grain*, the flowers yield the oil of *Neroli*, which is orange coloured, and the rind of the fruit yield the essential oil of orange, named *Portugal.* On this account this tree is the most valuable of all to the operative perfumer.

Citrus Bergamia, *Risso.*—The rind of the fruit, when expressed, yields the greenish yellow oil of bergamot, which is largely used in perfumery.

Citrus medica, *Linn.*—All the varieties of this species are used in perfumery, but the most important are var. medica proper, the citron, and var. Limonum, the Lemon, the essential oils of which are both extensively utilized.

Clerodendron inerme, *Gærtn.*—The flowers, yield by distillation, a very exquisite perfume, which has not yet been utilized.

On the Process of Gilding the Edges of Books.

We have been repeatedly asked to give a method of gilding the edges of books, but as no processes were forthcoming, we take the liberty of reproducing the same from the highest authority obtainable.

To gild the edges, the book should be put into the press straight, and on a level with the cheeks of the press between cutting-boards, the boards of the book being thrown back. The press should be screwed up very tightly, any projection of the cutting boards should be taken away with a chisel. If the paper is unsized, or at all spongy, the edge should be sized and left to dry. This may be ascertained by wetting a leaf with the tongue; if spongy, the moisture will sink through, as in blotting paper. The edge should be scraped quite flet, and perfectly even, care being taken to scrape every part equally, or one part of the edge will be hollow, or perhaps one side scraped down, and this will make one square larger than the other. When scraped quite smooth and evenly, a mixture of black lead and thin glair water is painted over the edge, and with a hard brush it is well brushed until dry.

The gold is now cut on the gold cushion. Lift a leaf out of the book with the gold knife, lay it on the gold cushion, breathe gently on the centre of the leaf to lay it flat i[illegible] be cut with ease to any size. Th[illegible] is now glaired evenly, and the gold is taken up with [illegible]e of paper previously greased by drawing over the head. The gold is then gently laid on the edge which has been glaired. The whole edge or end being done, it is allowed to get perfectly dry, which will occupy two hours.

Before using the burnisher on the gold itself some gilders lay a piece of fine paper on the gold and gently flatten it with the burnisher. Books are often treated in this manner; they then become dull gilt. When intended to be bright, a waxed cloth should be gently rubbed over the surface two or three times before using the burnisher. The beauty of burnishing depends upon the edge presenting a solid and uniform metallic surface without any marks of the burnisher.

GILDING BOOKS.—White of egg, well beaten up, is the ordinary sticking material used by binders to put the gold leaf on. The leather back of the book is varnished with it and when dry, a strip of gold leaf is put on the place where the letters or ornaments are to be placed; the letters used are common printing types (they must be new, however, and not be used with printing ink.) They are heated a little above the boiling point of water, which is easily tried with a wet finger, and then they are pressed on the gold leaf for a few seconds only, when the heating of the albumen [illegible] white of egg, under it fixes them [illegible] leather of the book. The ornamental [illegible] used are commonly made of brass, [illegible] manufactured for the use of book binde[illegible] while the type is screwed in an appropria[illegible] brass or iron holder, with wooden handle. The back of a well bound book being alway[illegible] round, the proper way of putting on th[illegible] gilded letters and ornaments requires a certain way of manipulation, which it is best to acquire by visiting some good book-binder's shop in any large city or town, to see the operation, and use your eyes properly so as to get all little details. The sides of books being flat, it is best to put the letters and ornaments under the press. The

type is put up in a proper form, it is heated, put under the press with the varnished side of the book, covered with gold leaf on the right place, and the press screwed down. Sometimes the binder puts the strip of gold leaf on the face of the type, in place of on the book. This is equally good, and, under certain circumstances, preferable.

Contact Process for the Manufacture of Sulphuric Acid.

(*Concluded from page 213*)

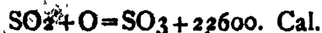
Armed with these preliminary remarks regarding the nature of SO_2, we shall at once plunge into the working and details of the Contact process. Roughly, we shall divide the whole process into three important operations I (a) the preparation of a mixture of SO_2 (obtained either by burning sulphur or roasting iron pyrites as the case may be) and oxygen (from the air), (b) the purification of the mixture to get rid of "dust particles" and arsenical impurities which attack the platinum and render it quite inefficient as a catalyzer, II. the formation of sulphur tri-oxide, in the presence of platinized asbestos, and III. the combination of SO_3 with water or steam to form sulphuric acid H_2SO_4.

Operation I (a) Corresponds to or rather is just the same as in the old Lead Chamber process. A number of furnaces can be arranged for the roasting of pyrites or if pyrites is not available sulphur may be burnt; so that either way, SO_2 or sulphur dioxide is produced. This SO_2 is next mixed with air instead of pure oxygen, though the Nitrogen which is also present in the air does by its necessary interference, impede the reaction to a certain extent. Still, taking into consideration the fact that air can be had gratis, pure oxygen cannot be economically employed. It should be noted that twice the amount of oxygen, that is actually demanded by equation $SO_2 + O = SO_3$ is employed. The reason for this is given by the law of mass action, according to which the greater concentration of either SO_2 or O, that is demanded by the equation helps to press the re-action towards the right hand side of the equation, by reducing the chances of SO_3 splitting up into SO_2+O. This law of "mass action" is of very great importance in all chemical reactions, but we can do nothing more than merely mention it here, as entering into its details will only non plus the ordinary layman. In I (a), therefore we prepare a mixture of SO_2 and oxygen.

Now about I(b). Platinized asbestos is very costly and in spite of its great reactivity as a catalytic agent, the enormous price which one has to invest in purchasing it often makes its use impossible on a manufacturing scale. It clearly follows, therefore, that every precaution must be taken to see that its efficiency is not impaired to the slightest degree. This has for a long time, been a difficult task indeed, especially as the sulphur di-oxide brings in its train a host of injurious substances. All these must be checked off, before the plantinum is brought into contact with the mixture of SO_2. This difficult task has been finally achieved by the admirable perseverance of Knietsch of the Badische Anilin and Sodafabrik' the great chemical factory at Mannheim, Germany, Two things, prominently must be got rid of. (1) Dust particles, (2) Volatile arsenic compounds, which are present in the pyrites and being volatile are carried over along with SO_2. The dust particles can be made to pass through certain chambers

which will arrest them and to see that the gas has been rendered dust free, it is subjected to what is known as the optical test i. e. it is passed through a tube closed at both ends with glass-plates and is examined to see that it is perfectly transparent and free from nebulous masses after this the arsenic compounds have to be completely got rid of. Knietsch has, after varied and various experiments, successfully achieved his aim, by blowing steam into the gas mixture.

II. With regard to the formation of sulphur tri-oxide, we have seen above how temperature plays an important part. If the temperature goes below 400°, there is little or no combination, while if it goes very high above 400°, the sulphur tri-oxide dissociates inio SO_2+O. Add to this the fact that when SO_2+O combine, they evolve a large amount of heat, which will naturally raise the temperature pretty high. This evolved heat must in some way or other be carried away and utilized if possible so that there will be no waste of energy : yet taking care to see that the temperature of the whole apparatus does not go above 400°. This is very successfully achieved, by utilizing the heat evolved, to heat a fresh portion of the gas mixture before it actually comes in contact with platinum. The exo-thermic re-action is expressed by the following equation.



$SO_2+O=SO_3+22600$. Cal.

The apparatus is costructed on a simple plan. The tubes, S. R., contain the platinized asbestos R, supported on small sieve (shown in the middle tube). When the operatien is to start, the apparatus should be heated to 400°. The purified gases coming from the furnace are first made to pass around the out-side of the tubes whereby they got heated to the desired temperature at the expense of the gas system within. When the proper tempera'ure is reached, the gases are allowed to enter the tubes where sulphur tri-oxide is formed with an evolution of heat, in accordance with the equation given above. By increasing or diminishing the flow of the incoming gas, whereby the quantity of gas let in can be measured and controlled, the temperature of the whole can be nicely and satisfactorily regulated. In this way there will be no difficulty in manipulating the temperatu e, which if unnoticed and un-guarded retards the re-action.

III.—The last step is the production of H_2SO_4 or sulphuric acid, according to the equation $H_2O+SO_3=H_2SO_4$. The re-action re-presented by this equation is a verv energetic one, a great amount of heat is produced and as a consequence when water and SO_3 combine, an amount of SO_3 fumes escapes and this means an unnecessary loss. To over-come this dilute sulphuric acid was employed to absorb sulphur tri-oxide, and this also presented the same difficulty. It was finally proved after a number of ex[illegible]ments, that sulphuric acid of 97 p[illegible] 98 p. c. serves as the best absorbent. T[illegible] acid helps the combination very much. Car[e] should be taken to see after successtve intervals, that the concentration of the acid does not change and this is done by the gradual add'tion of water because, the acid of this particular strength is the best reagent for the rapid and immediate absorption of sulphur tri-oxide. There are two reasons for such a precaution. Sulphur tri-oxide in the presence of traces of water passes over into a new asbestine modifcation having the composition $(SO_3)_2$ while the usually comm. possesses the formula

(SO_3) i. e. to say the asbestine modification is a polymer of the ordinary form. This polymer form is very slowly absorbed by the sulphuric acid. Secondly that at the concentration of 97·98 p. c the system x SO_3 + yHO_2 has a minimum of vapor tension, which is very low and this fact accounts for the stability of the acid and the rapid rate of absorption. We shall only mention this fact as it is very important but we shall not go into its details as it is beyond the scope of lay-men.

Anybody can see therefore from the foregoing description that the "contact process" will very soon displace the old Lead Chamber process. The old Lead Chamber process' is not only elaborate but unwieldy and the huge construction of the towers, the mystery of the re-action of the oxides of Nitrogen and lastly the simplicity and the efficiency of the new process threaten to make its existence short-lived.

N. Godbole, M. A., B. Sc.

Morphine and its Preparations.

(*Continued from page 215*)

Morphia is manufactured by the Gregory Robertson system modified in a few minor details. The opium is steeped in small vats with water, and the liquor passed through blanket filters. The maceration of the residue is repeated until the filtrate is colourless. The mixed filtrates are evaporated by steam to a thin syrupy consistence. Chloride of calcium is then added in the proportion of about 5 p. c. of the weight of the opium used, and the mixture evaporated until it solidifies on cooling. The crystalline magma is then powerfully pressed. The dry cake is dissolved in boiling distilled water, filtered, and the filtrate evaporated until it solidifies on coolling. Pressure is again applied to the magma, and the. resulting cake again dissolved in water, and this pr cess is repeated perhaps a dozen times, until the cake is almost white. The expressed mother liquors are again worked up for morphia. The nearly white cake is finally dissolved in boiling distilled water, and ammonia in slight excess added. The ppt. is collected and worked with cold distilled water, and until it ceases to give the reaction for chlorides. The pptd. morphia is then neutralized with hydrochloric acid, and the solution crystallized. The crystals are pressed, and mixed with twice their weight of water and wood charcoal added in the proportion of 2 oz. to each ℔ of the mass. The mixture is heated to 200° F. for about 20 minutes, and then filtered. On cooling the hydrochlorate of morphia separates in crystals. (Charcoal from the *Butea Frondosa* is used; it was selected on account of its comparative freedom from saline matter. Though wood charcoal possesses feebler decolorizing power than animal, it had to be used on acconnt of native prejudice against animal charcoal.) Codeia is obtained from the mother liquor left after the pptn. of the morphia by ammonia. The liquor is concentrated to a moist mass and strongly pressed; the cake is moistened with water and again pressed, and this is repeated until the alkaloid is nearly white. The cake is broken up in water, and caustic potash added in considerable excess. The codeia separates in crystals slightly coloured. It is finally purified by crystallization from alcohol. Narcotine is obtained by digesting with hydrochloric acid and the insoluble residne left by the action of water on opium,

West Indian arrowroot, the produce of Maranta arundinacea, *Linn.*, is a name given to distinguish it from East Indian, the produce of Curcuma angustifolia, *Roxb.* Other species such as, M. Ramosissima yields arrowroot also. West Indian arrowroot thrives well in India and is cultivated with the greatest ease. When everyone is trying to take up any industry, why not take to the cultivation of arrowroot ? It requires neither much skill nor money, and it pays well. There is no reason why we should import this important food substance in large quantities, every year, when it can be produced here, thus saving freight and affording means of livelihood to many unemployed hands. The following method of cultivation and preparation of the farina in Bengal, is given by Firminger, and may be accepted as the best statement, more or less applicable to all India :—"The root," he writes, "should be put in the ground in the month of May. Drills should be made about three or four inches deep and two feet apart, in which the roots should be laid at the distance of a foot and a half from one another, and the earth covered over them. As the plants grow, they should be earthed up in the same manner that potatoes are. They love a good rich soil, and plenty of water during the time of their growth, which latter, indeed, they get naturally, as their growing time is during the rains. They bear their small white flowers, about August, and in January or February the crop may be taken up for use. A month or two previous, however, water should be entirely withholden, to allow the roots to ripen. They are of a pure ivory white colour, and should be as large as moderate sized carrots. The smaller ones should be reserved for a fresh planting, and the pointed ends also of the larger ones, at the extremities of which the eyes are situated, should be broken off, three inches in length, and kept for the same purpose. The mode of preparing the arrowroot is very simple. The roots after being well washed should be pounded to a pulp in a wooden mortar, which may be hired for the occasion from the bazar. The pulp should be thrown into a large vessel of water, which will become turbid and milky, a portion of the pulp remaining suspended in it as a fibrous mass. The fibrous part should be lifted up, rinsed, pounded again in the mortar, thrown again into the water, lifted up a second time, rinsed, and then thrown away. The milky looking water should be then strained through a coarse cloth into another vessel, and when the sediment has settled, the water should be poured gently off, and clean fresh water poured upon the sediment. This, after having been well stirred up, should be strained through a fine cloth, and on settling the water should again be carefully and gently drained away. The sediment, which is then fine pure arrowroot, should be dried on sheets of paper by exposure to the sun." As to profits, etc., Dr. Shortt furnishes an estimate of the expense of cultivation which amounts to Rs. 50 per acre. He then adds :—"The average crop of rhizomes produced on an acre of land is 2,500 pounds, yielding 400 pounds of farina the average is ¼ the quantity of the cornus, but for safety I have fixed it at 1/6th the quantity which at four annas the pound will realise Rs. 100 ; the retail price of arrowroot is from 12 annas to Re. 1 the pound, and according to my estimate, deducting Rs. 50 for cost of cultivation, there is a balance of Rs. 50 as the net profit. With care and attention in the cultivation and preparation of the arrowroot, the profit will be found to exceed the estimate greatly." Certainly this article ought to draw the attention of our small capitalists.

Leaderettes.

Financial Results of Industrial Research.

In his Presidential address before the American Chemical Society A. D. Little cited some extraordinary figures to show the first fruits of the systematic industrial research that has only just begun in America. Here are a few of them :

Machinery has reduced the labor cost of seven crops by $681,000,000 as measured by the methods of only fifty years ago.

The boot and shoe trade has been revolutionsed by the improvement of machinery.

The entire automobile industry is the result of such research.

It has reduced the price of aluminum from 12 dols a pound in 1886 to 22 cents.

In less than twenty years it has given rise to absolutely new industries, such as the making of carborundum, of artificial graphite and calcium carbide and the industrial applications of acetylene.

One company engaged in the manufacture of high explosives maintains a research laboratory employing 250 highly paid chemists, which yields 1,000,000 dols a year profit.

The Gayley invention of the dry air blast in the manufacture of iron is saving the American people from 15,000,000 dols to $20,000,000 annually.

The Frasch device of melting sulphur in its beds, one thousand feet below the surface of the earth, and then pumping it up, opened up the vast sulphur mines of Louisiana, and the substitution of compressed air further simplified the work.

Another invention of Frasch's solved the long baffling problem of how to utilise the crude sulphur bearing Canadian and Ohio oils.

Other Uses of Saw Dust.

It is not generally known that sugar is manufactured from saw dust now a days. This sugar cannot be crystallized for ordinary table use but can be made to yield alcohol. Classen's process, which is the one popularly used, makes use of the fact that saw dust, digested with a weak solution of sulphurous acid under 6 or 7 atmospheres, is converted into sugar with a yield of about 25 per cent and that 4/5 of this can be fermented into alcohol. Besides sugar, oxalic acid is made from sawdust by Guy-Lussac's process also. By this process 2 lbs. of sawdust are made to yield 1lb. of oxalic acid Sawdust is also utilized in the manufacture of artificial wood, which is composed of wood chips and shavings, sawdust, lime, glycerine, sodium silicate, and linseed oil. This compound is pressed in moulds, and left until hard and dry, when it can be turned, sawn, planed, and polished like wood. A waste substance, whose industrial uses are so varied and numerous, ought to draw our serious attention.

Is Electro-plating Doomed ?

The process of electroplating on a large scale is going to be superseded by a marvellous invention, of Schoop, a Swiss engineer, by which a deposit of any metal can be made upon any object—wood, paper, lace, etc. The Scientific American, in a recent issue, describes it as a sort of "pistol held in one hand and provided with an oxyhydrogen blast, which progressively melts a metal wire fed to it, while an air

blast sprays the melted metal against the surface to be coated." By this simple and ingenious process any object can be covered with aluminium, copper, gold, lead, silver, or any other metal. This coating adheres to the surface, forming an intimate bond with it, but if a cast be wanted that can be separated from the foundation, all that is necessary is to coat the latter with graphite, talcum or grease before applying the metal. The coating can be made as thin or as thick as desired. This process is not only valuable for reproducing works of art, but its most important use will undoubtedly be in the industrial arts for lining vessels to make them resist liquids, for coating structural iron work and for all the work that is now done by electroplating and galvanizing.

Still Another Waste Substance.

When one sees with his own eyes, during this season, the vast quantity of oranges in the market, perhaps no one asks where the rinds or skins of these oranges go? These are very little devoured by cattle and the rest goes to the dust-bins we think. Now, any enterprising man can engage some vagabond boys to collect these rinds from large towns, thus giving them a means of extra earning and making a profit for himself. These rinds can be cleared of dust etc., by simple washing in water, These then can be squeezed in a press for the oil, which can be used for making cheap essences. Or a tincture, which is official in the Br. Pharmacopœia, can be made by macerating for a week or so 5 ozs. of the peel to one pint of 90 p. c. alcohol. One ounce of this tincture can then be added to 7 ozs of simple syrup to make orange syrup. Surely such a vast quantity of rinds ought not to be wasted away: it is simply throwing away money.

Electric Ice Cream Freezer.

Electricity has revolutionised the present state of many industries, so much so that some call this era as the Age of Electricity. Now, an electric ice cream freezer has been devised by a London inventor, which will shortly replace the old fashioned freezer. In the usual freezer tank, generally of larger size for wholesale manufacture, hotels, clubs, or the like, is mounted a tubular coil supplied from a carbonic acid machine which takes the place of ice and salt. The small machine is mounted on a wall frame together with a small electric motor which drives it by belt from above, so that the outfit takes up very little floor space Cleanliness is secured by the entire absence of crushed ice and salt, and there are no wet floors. It is claimed the electric device gives considerable economy in working. Another point is that where there are electric motors already in use for other purposes, the ice cream machine can be driven from them without entailing the extra expense of a motor.

Brief Queries and Answers.

J. D. R., Kalimpong.—Offers to give away one knitted woollen Galaband to every reader of Industry who who shall send names and addresses of ten respectable persons with an order of 10 galabands of 4" × ¼" × 5" priced at Re 1-12-0. Intending persons are requested to send one-fourth the amount of order and to mention the colour of the article and his roll no.

P. S. P., Vaikom.—Wants to know the names and addresses of buyers of Banana flour in England, France and Germany ? What is the current price of it per pound ?

"Bookman," Chikballapur. Wants to dispose of the following books :—(a) One complete set of Agricultural Encyclopœdia, 12 vols. Rs. 100 (b) Modern Power Generators with models. 2 vols. Rs. 45. (c) Science in modern life. 6 vols. Rs 40. (d) Kelly's Directory of the world 1911. Rs. 15. (e) Books on Sugar Cane and Sugar Manufacture. Prices on application to "Bookman," C/o Industry.

The Untied Washing & Dyeing Co., Madras.—Wants to know if there are any journals on the Laundry business exclusively?

For the Chemical compositions you can correspond with H C/o Industry.

I, V. G. R., Nuzvid —Wants to know where to get locket edition of Bhagavat Gita to be hung in watch chains.

Manager, American Trading Co., Cottonpet.—Wants to announce that he can supply Ameriean things as he is a chief representative to some of the companies of U. S. A. (2) V S. M., Tirupatur is infromed that the book to suit him is "Encyclopœdia of Business opportunities and Trade Secrets" 3 vols. Rs. 15 (3) "Banker," Baroda Camp, is informed that he can obtain a bread and biscuit making machinery with complete outfits for Rs. 850, the machine will turn out 500 pieces in 71/2". For operating on a small scale the "Yankee Protecto Plate" can be used, the price of which is Rs 5 only (4) A. P. and B., Alwar, is informed that he can get machine made tin boxes from E. J. Vance Box Co., Bay City, Mich., U. S. A., and Am. Can Co., New York, U. S A, (5) He is ready to give away one 84 Needles Cylinder Harrison Knitting Machine gratis to those who will undertake to sell his one dozen machines @ 20% commission per machine. (6) He can supply mercerised cotton balls, silk finish and woollen yarns of different colours. (7) He is ready to supply, to the readers of Industry. cotton socks at Rs, 2-8 and woollen socks at Rs. 7-8 por dozen pairs respectively. (8) Mr. P. S. Michael, Calcutta, is informed that he can use mendets which will mend all leaks in aluminium, granite, tin, copper, brass, sheet iron wares and rubber goods, without the use of heat. solder, cement, or rivet.

S. C. D., Barpeta.—Wants to know where to get a Genjee (Gueruesy frock) weaving machine ?

S. M. K. J, Jhang City.—Wants to buy a machine for making sewing thread.

B. S. Ganeswaran, Paunapuram.—Wants agents in Calcutta who will undertake to sell cardamoms at one p. c. commission.

N. N. J, Mangaon —Many thanks for your information. (2) Wants to know whether the following methods are in practice now, Limoge, champleve, Cloisome, Plaque-a-Jour, and Bassetaille ? (3) How iron plates can be enamelled by means of electro-deposition ? (4) Gum Water is preferable for adhering the enamel powder to plates.

A. S. Nagpur —Kindly write your name and address legibly (2) What is the price of an artificial beehive ? (3) Wants buyers of lamp black. (4) Wants buyers of hairs, animal blood, hoofs, and guts, etc.

S. Pattu, Manuargndi.—You can get the insulated copper wire for coils and batteries from B. Barooah, Calcutta. (2) Wants to know which firm in India can supply him Electric toy articles ?

Messers Hurromal, Sind.—Kindly write your name legibly. The address you want is C P. Bajpai, Gorakhpur. (2) Wants buyers of tooth powders, soda and lemonade powders, blue ink powder, and blue and copying writing fluids.

K M. S.. Ahmedabad.—The Times Book Club, Oxford St, London, can supply you second hand books

S. G., Polur Union —An article on the distillation of wood will appear shortly. The industry is a profitable one. You can get the apparatus, etc from Blair, Campbell and Mc-Lean, Ltd., Woodville St., Govan, Glasgow.

G. S Josver & Sons, Mysore —Please state your query clearly. Do you want to cleanse white shawls ? If so, a method can be given in our next.

Radhey Lall, Bareilly.—Wants to dispose of a Durbar anto knitter at Rs. 100 only.

G. G. Dharadhar, 56, Zaoba's Mart, Thakurdwar, Bombay —Wants to know the names and addresses of velvet manufacturing companies of India and foreign countries.

T. S. S., Kannadiputhur.—For a hand machice for making ordinary granulated sugar into feathery Cotton Candy, please write to the Globe Electric & Mfg. Co, 61 65, Frank-

fort St., New York, U. S. A, mentioning Industry.

A T. K, Margao—The Bally Paper Mills have ceased to exist. Messers John Dickinson & Co, 3, Lyon's Range, Calcutta, will be able to supply you any kind of paper (2) Wants to know where to get a machine for cutting papers into required sizes and shapes ?

Roll No. 491, Firozabad.—Yes, the artesian wells can be bored in U. P. For necessary equipment kindly write to messers Richardson and Cruddas, Byculla Iron Works, Bombay, mentioning Industry. Have you tried the formulas for making kerosene oil odourless which have already appeared in the Industry ? If so, which one and with what result ?

A. S M., Kottar.—For motor trucks kindly write to the following firms mentioning Industry:—(a) the Kelly Springfield Motor Truck Co., springfield, Ohio (c) The Lauth-Juergens Motor Car Co., 422. Bank Chambers, Detroit, Mich. Both of U. S. A.

Mr. D. K. William, The Tannery, Kandy, Ceylon.—The sample of glue which you sent is very good Its viscocity and adhesive power is very great. Why don't you advertize when your article is of such superior quality ?

Dr G., Sholapur.—Has Mr. P. N. of Garauli communicated with you ?

T. Virappa, Pleader, Chikballapur.—Wants buyers of ground nut oil of superior quality

A C. S, Muttra.—The Hindi equivalents for Guya babul are Vilayati Kikar, Vilayati babul, pissi babul gu-kikar, gand babul, and guh babul. (2) Wants to buy a copy of Todd's Rajasthan in the Bengalee language.

The Manager, the Ayurvedic Chemical Pharmacy, Sholapur.—Wants to know the name and address of a firm which manufacture lamp burners in Japan.

Dr. D, Midnapore.—Wants addresses of lead pencil makers of America, Japan and Germany.

Mg Ba Pe, c/o the "Sun" Rangoon.—Wants buyers of Soapstone. What is the current market value per ton of the same ?

Messers Thakurdas & Hotchand Bros., Sukkur. -They have kindly sent us the following answers in response. to several queries :—(a) they can supply machineries for paper cutting, for rice making, for rope making, etc. ; (b) they can supply jewellers' tools and Gota lace machines, and (c) all sorts of toys : wood, wool, wax, and tin.

J. R. M., Shegaon—Wants to know how ghee is made from cottonseed oil.

N B N, Sitapur.—Various replies re : motor car driving have already appeared.

J C. Ball & Co., Lyallpur.—They can supply the "Herculex" brick making machine for Rs. 500 and also best gur.

Mr. G. N. Mytu, Bari Dholepur.—Informs T. J. H., Dinapur, that he can supply batteries, etc for plating. (2) Informs Mr. L. B. P. G N. Kakadanga, that he will underfake to teach the art of gilding etc, for a slight remuneration (3) Informs Mr A. T. Guha that he can teach both stage and parlour conjuring by correspondence.

T. Z. U., Akyab.—Wants buyers of the following kinds of timber : khoreel, jarool, Gojon, Surubeit, Tilsur, and various other kinds.

D. V. S. R. & Bros, Meppadi.—Messrs Thacker, Spink & Co, Calcutta, may probably undertake to publish your chart.

B. S. N., Tinnevally—Kindly write to Messrs Burn & Co. Calcutta for an estimate for the erection of a small Electric Lighting Plant. Perhaps the Brush Elec. Lighting set will suit your purpose.

L P., Ahraura.—Can any firm supply him with canvas shoes, having wooden soles, without leather. Please quote prices.

Dr. N. Ghosh, 31, Satarpore, Bhagalpur City.—Informs R. T., Bankipore that he can undertake to cure hydrycele without operation but he must have to go over to him personally.

Badri Singh Verma, Atia.—Wants to know whether there is any book on book-keeping in the hindi language ? Also any institution which teaches Homoeopathic treatment by correspondence ?

B. V. R. R., Salun.—Yes, the knitting business is profitable one. Various kinds of knitters are on the market.

D. T. A., Gauhati.—Wants to know the detailed process of making Raniganj and Basel Mission Tiles. (2) can any body sell him a second hand or new printing press on monthly hire purchase system ?

Bhopal Singh, Hd. Clerk, 44th Infantry, Ajmeer.—Wants to know the address of any

institution, nearest to Ajmere, which teaches shorthand and typewriting.

N. Choliba, Golaghat.—Wants to buy cotton seed oil, carapa oil and mohua oil.

Roll No. 3524, Petai.—Wants to know the ingredients of and the method employed in making coffee powder as sold in the markets

T.L., Kirkee.—Lists of books on Poultry farming and Indian Gardening have already appeared. There are many kinds of rock drills for boring holes in the market. The Scott Gasoline rock drill is a very good one. We do not know about the spring of which you speak which is used to find out underground water. We also read that such instruments are used in Africa, Germany and America. Will any reader kindly oblige us by supplying the information?

S. E. Alman, Kankanady—Is there any person or firm that will receive a large quantity of copper coins which have been worn out by constant use and at what rate? (2) can any person supply him with the nuts of the fan palm?

Ram Narain, Tandlianwala.—Wants buyers of best ghee at Rs 49-8 per maund of 40 seers with one p c. commission. (2) can any one help him in securing agency, for the Punjab, of the Red Lamp brand cigarettes as manufactured by the Peninsular Tobacco Co., Ltd., of Monghyr?

P. L. Swamy, Kardha.—Wants to dispose of one oil mill worked by steam, complete with John Bull's Engine, boiler, and all usual fittings. Actual price, Rs. 5100. Direct communication for sale price will oblige.

Mr. D. Fairweather, Kegalle.—Can any Calcutta or Bombay firm supply him with dried dates, figs and other fruits?

Y. I. M., Mandalay Store.—Ask the help of any competent lawyer for the registration of your trademark.

E. G. Venkateswaraiat, Alapaalachery.—Wants to know how magic rings, through which the images of dead and living persons can be seen, are manufactured? Calls the attention of Mr. G. N. Mytu that he is ready to take up agency for Kabul Asafœtida for the Madras Presidency and the U. Province.

The P. C. T. Co., Pollachi.—Can't you take up any small trade as suggested in the pages of Industry? Can any merchant of firm supply them with empty tooth powder tins at wholesale rates?

S. L., Jaipur.—Wants addresses of service procuring agencies throughout the world.

M. B. Srinivasan, Fort, Kurnool—Wants buyers of Swadesi woolen socks and stockings of all grades.

Mr. S. Peters, Sitamarhi.—The Nestle and Anglo-Swiss Condensed Milk Co., 30, Strand Road, Calcutta are representatives in India of Nestle's Milo Food" For the registration of patents, please consult any lawyer.

K. E, Siva Rama Iyer, Kalpathi.—Wants buyers of pappadams. The address you wants are:—V. Nadarajah, Nudugoda, Undugoda, Ceylon, and G. N. Mytu, Postal Tutition School Bari Dholepur. Want buyers, in Colombo, of Malabar handloom made towels.

Mg Ba Pe, Rangoon.—For obtaing the essential oil from the Cassie Flowers the process of distillation may be employed. Distil them with double their weight of water. If that does not give good result, then employ the methods of maceration or enfluerage. Wants buyer of Cassie flowers and pods or perfume made from the flowers.

Calcutta Market.

Calcutta, Jan. 23.

EXCHANGE.

ank T T	1-4 1 16	Quiet
ank O D	1-4 1 8	
Months' D A	1-4 7-16	
„ „	1-4 5-16	

Government Loans

3	Per cent cash	... 82-8	to 83-8
3 1 2	do „	... 95-6	to 95-7
3 1-2	do month sight	... 95 8	to 95-9
3 1-2	do Bombay	... 95 5	

Interest and Discount.

Bank of England from	29th Jan 1914	4 %
Bank of Bombay from	15th Jan 1914	6 „
Bank of Bengal from	13 Nov 1913	7 „
Bank of Madras from	3rd Jan 1914	7 „

BULLION MARKET.

GOLD—	Rs.
English Bar—100 (touch) per tola ...	24-0 6
Australian Bar—(100 touch) ...	24 0 0
Sovereign—Victoria Shield, per piece	15-6 0

SILVER—

English Silver Bar of 17 ¼ dwt better per 100 tollah ... 78 4

PRODUCE MARKET.— Jan 21

RICE

Dwadkhani Rice—Rs	7-8 to 8-0	per md
Banktulshi	Rs 6-8	to 7 12
Boiled Patna	Rs 5-8	to 5-12
Ballam	Rs 5 8	to 5 12
Kazla	Rs 4-2	to 4 8

DAL

Moog Dal at Rs 5-4 to 5-8 (For Black kinds)
Yellow at Rs 8-8 to 9 8
Musur Dal at Rs 3-12 to Rs 4-4 per md
Arhar Dal at Rs 4 2 to Rs 5-9 per md

SUGAR DESI

Cane.—Benares Rs 11-8 to 12 0
Goor: Rs 3-12
Date—Dobara Rs 12-0 per md
Goor at Rs 6 to 6-4

SUGAR IMPORTED.

Cossipur first white at Rs 7-12 per md
Small grain at Rs 7-6 per md
Crystal at Rs 7-9-0
Java F. M. at Rs 7 per md

GHEE Rs 52 0

OPEN A TIN

OF

World Renowned

OHRI

Asafœdita

And note the pleasant and refreshing odour and its marvellous effects using it in vegetable meals. It is not the ordinary one commonly known by the name of Kabul asafoetida. It has won the world wide renown and immortal fame in the past years and has been used by the men of note and worth and highly appreciated by the Aurvedic Authorities and prominent medical figures of the west. Its chief and most singular recommendation is that besides giving most agreeable odour it prevents the growth of all the contagious diseases such as Cholera Plague and Malaria etc.

This Asafoetida is guaranteed to be free from adulterated substances. For more than a generation its delicate fragrance and prophylactic properties have rendered it the standard for its purpose, while its extreme purity and unchangeable quality give it all the advantages of the asafoetidas of the age. Sold at cheap rates. Try once and you will ask for the more.

Price per tin 12 tolas, Re. 1-8, 3 tins, Rs. 4, 1 dozen tins Rs. 15.

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Best Khuttan Musk or Kasturi per tola Rs. 38.

Best Tibet per tola Rs. 28.

Saffron.

Best Kashmir Moongra per tola Re. 1.

Wholesale per lb. Rs. 37.

Amber.

Best quality per tola Rs. 56.

PACHAKARPURAM.

Pure refined camphor, the best quality imported from Singapur, per tola Rs. 4-12.

SILAJIT.

Pure and refined best per tola Re. 1.

Gold Leaves per packet of 120 leaves Rs. 2 to Rs. 10.

Silver Leaves per packet of 120 leaves Ans. 6 to Re. 1-12.

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Technical Education.

That under the present circumstances of society and education in the country technological knowledge is supremely necessary requires no further elaboration. And therefore the people welcomed the scheme of technical education framed by the Government of Bengal to establish a Technical Institute in Calcutta, with enthusiasm. Although we do not think the scheme as published would serve the whole purpose of technical education in the country, yet we welcome it as a happy initiation. There is apprehension in some quarters that the supply of technically trained workers would outgrow the demand. Our vernacular contemporary *Bangabasi*, recently issued a pamphlet on the same subject suggesting the methods of technical education that will be suitable to our country. For our contemporary fears that the diplomaed students of the Calcutta Institute, most probably "will go about seeking service in some European Mills and Factory. If such be the case it will only benefit these mills and factories, for they will get skilled labour at cheaper rate. The instruction given at the Institute will then be useful neither to add to the wealth of the children of the soil nor to improve the condition of the people."

We endorse the views of our contemporary if technical education is imparted in our country without any regard to our technical needs. Technical education can only be of any use if it is turned to practical account. What are our technical wants? We have plenty of raw materials which can be turned to practical use by our people but which are being exported to foreign countries to be converted into necessities of life. But what we require to turn them to usefulness ourselves? (1) Well equipped technical knowledge and practical skill, (2) commercial enterprise and organisation, (3) munificent capital. Let us now consider these points.. Let us take the question of capital first. It does not depend upon any amount of training in individuals to draw it out. But it rests in the industrial spirit and a knowledge of the investor of proper security of its growth. It is asserted that the high rate of interest which money can bring in this country on good security drags its flow in commercial enterprise. But the figures and facts which can be had of the investment in industries belies this assertion. In 1906, that is the year just following the inauguration of the swadeshi movement fifteen Banks with a total capital of nearly 4 crores have sprung into existence, five

Navigation Companies with a capital of nearly 1.25 crores have been started, twenty-two cotton mills with a capital of nearly 4 crores were established. Jute mills, oil pressing mills, sugar factories, mining and mineral companies, besides many that are not known, have been launched with eno-rous capitals. Besides, 15 crores of rupees of which nearly 98 p. c. were purely private Indian savings, were in the P. O. Savings Bank at an interest of 3 p. c. and an enormous amount in Government and other securities at 3½ p.c. only. These show that capital in our country is not locked owing to enormous interest it can fetch on lending. The fact is that the investors require security for the investment and this security can only be had from properly trained industrialists.

Besides, the organisation of the co-operative societies in the interest of agriculture should give us an ample object lesson to form similar institutions in the interest of indegenous industries under Government patronage—to support the infant industries by loan of capital and by furnishing securities to investors of regular profit. The Dollar Banks of U. S. A. which are framed to supply capital to new industrialists, and to guide their works by expert advice and direction, would give us another example as to how we should proceed.

But a training in commercial organisation and practical skill is essential in any undertaking, commercial and industrial. And the scheme of technical education in our country should be so framed that it would produce men whose endeavours would profit the people generally and not only be means of supplying skilled labours for foreign exploiters. In every commercial and industrial undertaking in our country, in mineral exploits or manufacturing undertakings where resources of the country give ample field of work, the foreigners are always on the foreground with their imported capital and imported skilled labour. We do not of course grudge foreign capital, but we must see that we are not compelled to pay for the foreign capital more than what other nations pay. And unless we have skilled labourers we are compelled to do the same.

The present Amir of Afganisthan fully realises the difference in these two phases of the question and does not grant concessions to foreign capitalists to work rich mineral deposits in his country, but engages foreign experts to train his subjects to develop the resources of the country themselves. This shows that the Amir cares more for the permanent interests of his subjects, than for the temporary gain to his treasury from concessions to foreign syndicate on easy terms.

What the proper kind of technical education has done in Bombay and Baroda should be keenly studied by those who are interested in such training on this side of the country. We make no apology to quote the following from the excellent address Prof. T. K. Gajjar delivered in the Surat Industrial Conference .

"The Kalabhavan had a great share in the introduction of the dyeing industry in India. When our vegetable colours were driven out from the world's market, which they had held for centuries, by the marvellous colours modern chemistry had extracted from coal-tar ; when our dyers and weavers were reduced to poverty, their occupations having been taken up by others, there was no recourse left but to make use of these new colours and not to pay unncessarily

for the process of dyeing carried on outside India. Germany, the home of these chemical dyes, was anxious to secure a market for them in India. Our mill industry also needed a healthy growth and development. These considerations led me to suggest to the great colour manufacturers of Germany to train students and instruct native dyers in the use of their dyes if they desired India to become one of their great consumers. They appreciated the suggestion and acted upon it, and started their first laboratory in this very city and commenced to instruct students and native dyers in the processes connected with dyeing. When Mr J. N. Tata heard about this, he at once communicated with me and made up his mind to append a dye-house to his mill, with the help of dyers trained in my private laboratory at Baroda. Even a costly laboratory set of dyeing apparatus was presented to his mill through me by the German manufacrurers. Dyeing schools were soon after opened at Ahmedabad, Delhi, Cawnpore, Amritsar and other places under my supervision and several trained dyers were sent round as travelling agents. There are now several laboratories in Bombay connected with German offices where students are trained. These are the educational methods the Germans adopted for their purely commercial purposes, and the result is the present remarkable revival in our dyeing industry. My friend Mr. Tulsiram, who introduced dyeing into Madura, informed me, at the time of the last Bombay Congress, that 47,000 Surathi settlers have been blessing the trained dyer sent by me to Madura some years back, and the Glasgow turkey-red yarn manufacturers had to send their agents to Madura to enquire why all the imports were stopped and what were the methods of dyeing adopted there. Since that time an extensive use of coal tar colours is made in India, and thus is saved to her the margin of profit swallowed by Lancashire and Glasgow. The dyers and the experts of these German firms were assisted by the students of the Kalabhavan in developing the dye-house of our mill. They are saving the mill industry from stagnation, are giving remunerative work to thousands of workmen and showing productive investments of capital. They are successfully working the dye-houses which costly foreign experts failed to do. Had it not been for these pioneers to whom the flourishing conditions of mills is indebted to a great extent, our manufacturers would not have been enabled to meet the demands the Swadeshi movement is making on them."

The writer in the *Bangabasi* referred to above makes some suggestions as to how our technical education should be imparted. We quote the following from the same.

"That kind of instruction should be given in the Institute which will put these industries on a more prosperous condition by enabling those engaged in them to turn out things *larger in quantity*, *better in quality*, and if possible *at a cheaper cost*. There are many articles which may find a market in Europe and America, if made to suit European taste and which will help the further production of wealth in our country.

"There are many things for which there is a large local demand but the supply is either deficient in quantity or indifferent in quality. Instruction for the manufacture of such articles is of great importance. A few things of this kind may be mentioned here: (1) Soap made of *Sajji Mati* (fuller's earth) has long been in use, though foreign Bar-soap has superseded it to a certain extent

Poor people, however as well as washermen more or less still stick to it on account of its cheapness. The soap "can be easily improved without increasing the cost of production" (2) The use of leather goods has vastly increased in this country but no provision has been made in the Institute for imparting instruction in tanning. (3) The demand for steel trunks, cash boxes and other articles of the same kind, has also greatly developed. Country-made articles are preferred owing to their cheapness. But owing to want of knowledge the local manufacturers have not yet been able to enamel them and give them that finish which is so characteristic of the imported goods. Instruction may be given on this matter with considerable advantage. (4) Manufacture of toys (5) Dairy (6) Fish-culture and (7) Fruit-culture may also be taken in hand.

"Dairy and Fruit-culture may be taught in the Agricultural College at Sabour in Bhagalpur. A school of Pisciculture may be established in the neighbourhood of Calcutta in connection with the Technological Institute. Fish forms an important article of food of the people of Bengal. They cannot eat a mouthful of rice without it and even a beggar spends a pice a day to buy the cheapest kind, but the supply of fish is daily decreasing owing to the silting up of the rivers, jhils, water creeks and tanks. The price is also increasing in consequence. Even now it is fifty percent dearer than meat. If this goes on, in twenty or thirty years it will be a rare article of food.

"In our opinion the Technological Institute should be divided into two departments :—First the Primary Department, second the Department for Higher Training. In the first, instruction should be given in Bengali in the evening, in the second English should be the vehicle of instruction and the classes should be held in ordinary school hours. The Primary Department should have branches, scattered all over the country and if possible no schooling fee should be charged in this department. In these an elementary knowledge of modern discoveries and inventions, and of the improved tools and labour saving appliances should be imparted to the poor artisans and peasants, for their present poverty and their inability to face outside competition is largely due to the want of such knowledge. For instance, carpentry has become the monopoly of the Chinese in Calcutta, where they are to be found in Government offices and in the construction of large buildings. A chinese carpenter, because his work is better, gets nearly twice the wages of a Bengalee. A Bengalee can easily be taught to perform similar work. Blacksmiths, potters, goldsmiths, masons and others can also be taught to do better work, and they should have practical training at the Technological Institute. Arrangements should be made in the Primary Department for instruction both in *agriculture* and *handicrafts*.

"Only those students who have previously acquired an elementary knowledge of science or who have passed the I. Sc. examination should be admitted in the Higher Department. The subject to be taught here has been suggested in the Govt. report besides those that have already been indicated above. New subjects may hereafter be introduced to meet new requirements. Indeed such training should be given in the Institute as would turn out men capable of following independent professions for their livelihood and not *helpless candidates for service*. Such training will eventually facili-

tate the production of new wealth and improve the material condition of the people.

"The Commercial Department should be kept separate from the Technological Institute for the two are entirely different as stated above. A Commercial Institute should be established here like that of Bombay. Sons of merchants and landholders should receive a practical training here, and if possible provision should be made for them to serve as apprentices for a year or so in some European commercial houses, at the end of their college career. The measures indicated above will produce men capable of following independent professions, and then and then only will the object of the Institute be fulfilled."

We hope to revert to the subject in future.

The Art of Perfumery in India.—III.

(*Continued from page 239.*)

CONVOLVULUS SCOPARIUS.—It is the rhodium wood or rose wood. The wood is distilled with water to procure oil of rhodium. The oil is very fluid, and has a yellow colour, which in time, becomes red. It has somewhat of the rose odour and is used to adulterate the genuine otto. Its taste is bitter and aromatic, which it imparts to the otto as well as its fluidity. It is also used to lure fish and to kill rats.

Costus speciosus, *Sm.*—It is the kust root ; it may be used as a substitute for orris root, "but it is possible that the economic literature on the subject confuses this with two species of Saussurea."

Coumarin.—The Tonka or Tonquin bean, the fruit of the Dipterix odorata, and much used for perfuming snuff (not more than 3 % of ground beans may be added to snuff), contains coumarin. It is largely used in perfumery. Alcohol readily extracts it from the bean ; and by evaporating the alcoholic solution, we obtain the substance in a solid state. It forms brilliant white needles, soluble in hot water and alcohol. When heated, it melts and rises in vapour, which when inhaled acts powerfully upon the brain. The sweet-scented vernal grass contains coumarin and imparts to dry hay the odour of this substance. The following is a list of plants in which coumarin, either free or associoted with such closely allied acids as the melilotic and coumaric, has already been found :—(a) Angroecum fragrans, the Faham tea plant of Mauritus, (b) Asperula odorata, the common sweet woodruff, (c) Melilotus officinalis or common melilot, and (e) Hierochloe borealis, the nothern holy grass.

Crocus sativus, *Linn*—It yields the safforn. It is largely used in India in the preparation of Jufran attar, and in condiments and other eatab'es.

Cucumis sativus, *Linn.*—It is the cucumber. A perfume called *Sasa attar*, made from some part of this plant, was exhibited by the late renowned Dr. Kanai Lall Dey at the Colonial and Indian Exhibition, London.

Cupresus torulosa, *Don.*—The wood yields a resin often burned as incense.

Curcuma Aromatica, *Salisb.*—It is the wild turmeric. The powdered rhizome is employed by Hindu women as a fragrant cosmetic.

Cyperus rotundus, *Linn.*—An essential oil obtained from the rhizomes is used in Upper India to perfume clothes ; in Bengal the dried and powdered root is used as a perfume, and in drying to impart a scent to the fabric.

C. Scariosus, *R. Br.*—Is similarly employed.

C. Stoloniferus, *Retz.*—The tubers of this species are also used in perfumery.

Didymocarpus aromatica, *Wall.*—The whole plant is said to be used as a perfume.

Dryobalanops camphora, *Coleb.*—It yields camphor. See the article on camphor in Oct. 1913 issue

Elettaria Cardamomum, *Maton.* It is the lesser cardamom The seeds when distilled with water yields an essential oil, which is much used in perfumery.

Eucalyptus globulus.—The leaves are distilled with water to obtain the oil of Eucalyptus which is used in some toilet preparations. Eucalyptol surpasses any other in value for diluting the oils of roses, of orange flowers and other very costly oils, for which purpose it proves far more valuable than the oil of rosemery and other ethereal oils hitherto employed.

Eugenia pimenta.—The bark and leaves are distilled to procure the slightly yellow oil of pimento, which is used in perfume, soap, etc.

Ferula Suaveolens, *Aitch. et Hansl.*, and F. Sambul, *Hook. f.*, yield the musk scented root sumbul.

Foeniculum Vulgare, *Goertn.*—It is the fennel. The grain is distilled with water to obtain the white or pale yellow oil of fennel, which is much used for perfuming soaps.

Gaultheria fragrantissima.—It is the winter green. The whole plant is distilled to obtain the oil. A very remarkable article by Mr. Broughton (Late Govt. Quinologist at Ootacamund) appeared on the subject in the Pharm. Journal for Oct. 1871.

Hedychium spicatum, *Hom.*—The aromatic root stocks are used as an auxiliary in dyeing to impart a pleasant odour to fabrics, and when powdered, from an important ingredient of *Abir.*

H. Coronarium is *Dolon Champa.*—An otto may be utilized in Indian perfumery.

Hibiscus Abelmoschus, *Linn.*—It is the musk mallow, which has amber and musk scented seeds, employed as a poor substitute for musk in making cheap satchet powders.

H. Ficulens, *Linn.*—The seeds are employed to impart a fragrance to coffee.

Illicum Verum, *Hook. f.*—It is the Star anisee. The fruits are distilled with water for procuring an oil, which is used in perfumery.

Iris Florentia, *Linn.*—It is the iris or Orris root. The tubers or rhizomes are largely used in perfumery. The tubers are alosused for making the otto of orris of the European perfumers.

Jambosa Vulgaris.—It is the rose apple. The ripe fruit, when deprived of its seeds, is distilled three or four times, to procure rosewater.

Jasminum, *Linn.*—It comprises 90 species, of which 43 are natives of India. J. angustifolium is the *Vana Mallika.* J. arborescens is *Nava Mallika.* The flowers are distilled with water to procure an essential oil. J. grandiflorum is the *chameli.* The otto is obtained by the process of enfleurage J. humile is *subarnajui,* J. officinale is also known as *chameli.* The flowers yield a fragrant oil, similar to that of J. grandiflorum. The writer's opinion is that J. grandiflorum is the true Jasmine or *jui.* J. sambac is the *bel.* The otto is largely used in Indian perfumery.

Juniperis, several species.—The root of these are largely used as incense. The fruits

of J. communis are distilled with water to procure an essential oil.

Jurinea macrocephala, *Benth*—The roots are used as an incense under the name of *dhup*.

Lavandula, *Linn.*—There are some 20 species, mostly Mediterranean. Of these, two—L. Gibsoni, *Grah.*, and L. Burmanni, *Benth.*, are natives of India The latter might be utilized in the manufacture of oil of lavender, a substance at present entirely imported from Europe, and which is the produce of L. vera, *D. C.*

Lawsonia alba, *Lam.*—It is the much prized Henna plant. The flowers are distilled with water to procure the highly scented otto of henna.

Magnolia, several species.—There flowers are remarkably fragrant and the ottos may be obtained by the process of enfleurage. The yield is very small in each case and hence their odours are synthetically built up.

Mangifera indica, *Linn.*—It is the Mango tree. One of the perfumes exhibited at the Colonial and Indian Exhibition, and called *Amb atar*, was prepared from some part of this tree.

Melaleuca Leucadeddron, *Linn.* The leaves are distilled with water to procure the cajuput oil, which is sometimes used in perfumery.

Melilotus, *Juss.*—This comprises 12 species, of which, three are natives of India. They owe their fragrance to coumarin, which may be extracted by exhaustion with either and purified by repeated crystallisation with alcohol. Coumarin is also now manufactured synthetically from salicylol and salicylic aldehyde.

Mentha, *Linn.*—Various species. See an article on oil of Peppermint and Menthol in previous issues.

Mesua ferrea, *Linn.*—It is the Nagkesar tree. The flowers are distilled with water to obtain a fragrant otto.

Michelia champaca, *Linn.*—Michelia comprises 12 species, all natives of India. The flowers yield the highly prized otto, which somewhat resembles Ilang and for which it is used as an adulterant.

Mimusops Elengi, *Linn.* The flowers of this plant is the source of the perfume called *Bakul atar*.

Morina coulteriana, *Royle.* Used as an incense by the Buddhists.

Murraya exotica, *Linn.* The flowers are utilized to procure the otto of *Kamini*.

Myristica fragrans, *Houtt.*, is the nutmeg tree. The nut and mace both yield essential oils, which are largely used in perfumery,

Myrtus communis, *Linn.*, is the common myrtle tree. In Europe an essential oil, distilled from the leaves, is largely employed in perfumery, under the name of *Eau d' Auge*.

Narcissus, *Linn.* Several species are met with in India. Some of their flowers yield an oil, which resembles *Bakul atar* in odour.

Nardostachys Jatamausi, *Dc.* It is the spikenard, The root enters largely into the composition of native perfumery, but chiefly in combination with valerion.

Nerium Odorum, *Soland.* *Karabir attar* is obtained from the flowers of this plant.

Nyctanthes Arbor-tristis, *Linn.* The flowers are employed in making *Sewli* or *Sephali atar*.

Ochna Squarrosa, *Linn.*, and O. Grandiflora. These are varieties of champac. The flowers may be utilised for making ottos.

Ochrocarpus longifolius, *Benth.*—It is

the Nag-kesar tree. A perfume resembling that of violets is said to be extracted from the flowerbuds.

Ocimum Basilicum, *Linn.* There are several varieties of Basil or *tulsi.* The leaves are distilled with water to procure *atars.*

Origanum Marjorana, *Linn.* It is the Marjoram. An essential oil is distilled from the seeds which is used as a perfume.

Pandanus odoratissimus, *Willed.* The fragrant bracts are distilled with water to procure *keora atar* and keora-arak. These fetch very high prices.

Pergularia minor, *Audr.* The flowers are employed in the preparation of an atar.

Peucedanum gràveolens, *Benth.* The crushed fruit yields an essential oil on being submitted to aqueous distillation, which is used in perfuming soaps. The distillate is Dill-water.

Phoenix dactyl fera, *Linn.* It is the Date palm. From the fresh spathes, is obtained, by distillation, a fragrant perfume, which is highly prized by Arabs and Persians.

(*To be continued.*)

Morphine and its Preparations.

(*Concluded from page 244.)*

OLEATUM MORPHINE—is made by dissolving one (or more if ordered) grain of morphine in 60 grains of oleic acid.

LIQUOR MORPHIA ACETATIS.—Dissolve morphine acetate 17½ grs. in distilled water and 90 p. c. alcohol, of each, 1 oz. ; and diluted acetic acid, 38 minims, and make up to 4 oz. with distilled water. Dose 10 to 60 mins.

LIQUOR MORPHIA HYDROCHLORIDE.—Dissolve morphine hydrochloride 17½ grs. in distilled water and 90 p. c. alcohol, of each, 1 oz and diluted hydrochloric acid 38 minims and add distilled water to make 4 oz. Dose. 10 to 60 mins.

SUPPOSITORIA MORPHINE.—Morphine hydrochloride 3 grs. and oil of thebroma 177 grs., in 12 conical suppositories.

INJECTIO MORPHINE HYPODERMICA.—Dissolve morphine tartrate 50 grs. in water which has been boiled and cooled, to produce 1100 minims. Dose, by subcutaneous injection, 2 to 5 minims.

LIQUOR MORPHIA TARTRATIS.—Dissolve morphine tartrate 17½ grs. in distilled water and 90 p. c. alcohol, of each 1 oz. and make up to 4 oz. with distilled water. Action and dose same as hydrochloride and acetate solutions.

MORPHINATED WATER.—Chloroform water saturated with morphine, is used in testing opium.

INJECTIO MORPHINE ACETATE (1 gr. in 6 mins.) 3 drs. ; atropine sulphate, one grain. Dose.—1 to 3 minims.

INSUFFLATIO MORPHINE.—Morphine hydrochloride ¼ gr., Bismuth Oxychloride 1 gr., starch ½ gr.

LINCTUS MORPHINE.—Solution of morphine hydrochloride 3 mins., treacle 60 grs., water to 1 dr. May be more agreeably flavoured with syrup of lemon in lieu of treacle. Dose.—A teaspoonful 3 or 4 times a day.

MISTURA MORPHINE ET PHENAZONI COMPOSITA.—Solution of morphine hydrochloride 10 mins., Phenazone 15 grs., Tinct. Ricini, 20 mins., spt. chloroform 10 mins, water to 1 ounce. This forms what may be said a specific for spàsmodic dysmenorrhoea. Dose. 1 ounce.

LINCTUS SEDATIVUS.—Solution of morphine acetate 8 mins., spt. chloroform 3

mins., Lemon juice 15 mins., mucilage of acacia to 1 dr. Dose —1 dr.

LIQUOR MORPHIA BIMECONATIS.—Morphine 14½ grs., meconic acid 12 grs., 90% Alcohol 1 oz., mix and add distilled water to make 4 oz.—Dose.—5 to 40 mins.

Opium and morphine may poison infants through the mother's milk ; see a case in Br. Medical Journal, 11/85, 1150.

DIONIN. - Is Ethyl morphine Hydrochloride. Relieves simple or whooping cough. Recommended to replace codeine and morphine in bronchitts, pulmonary emphysema, and bronchial asthma.

HEROIN HYDROCHLORIDE—Is Diacetyl morphine hydrochloride. Possesses in a greater degree the properties of codeine. Does not constipate so much as the morphine salt. Phthisical patients especially have been greatly benefited by it. Also of value in asthma and bronchitis.

GLYCO-HEROIN.—Is a patent medicine. Is given for coughs.

PERONIN is Benzoyl Morphine Hydrochloride. Is a mild sedative and analgesic, recommended in cough, asthma, phthisis, rheumatism, and neuralgia As 5 per cent. solution causes deep anesthesia when applied to the eyes.

GLYCAPHORM.—It is Glycerole of Diacetyl morphine Hydrochoride. Contains 1/48 grain Heroin hydrochloride in 1 dr. of a vehicle consisting of Glycerin 3, syrup of roses 4. and water 1 part Dose.—1 to 2 drs. This preparation forms a useful linctus for coughs, and is employed in bronchitis, pertussis, laryngitis, asthma, and similar disorders.

LIQUOR MORPHIA SULPHATIS.—Morphine sulphate 1, 90 p. c alcohol 25, Distilled water to 100 Must be distinguished from that used in the U. S. A, which contains 1 gr. in an ounce of distilled water. A preparation known as *Magendie's solution* of morphine is also used in U. S. A. ; it is 16 times stronger than the last (containing 16 grs. in the ounce). Magendie's solution in France is slightly weeker than that of the U. S. A. ; it contains 1 part of morphine acetate in 37½.

Horns & Horn-Work.

For a very long time horns have been largely utilised in the manufactures of useful goods and have formed an important article of export to Foreign countries from India. As the Fauna of India is numerous and varied, it is no wonder, therefore, that the animals, which yield horns of commercial and industrial importance, would be numerous and varied also. Some of them may be enumerated here :—

Axis maculatus, *Gray*. The spotted Deer.

A. porcinus, *Zimm*. The Hog Deer.

Bubalus arni, *Shaw*. The Wild Buffalo.

Capra hircus, *Linn*. The Domestic Goat.

C. Megaceros, *Hutton*. The Markhor.

C. Sibirica, *Meyer*. The Himalayan Ibex.

Cervulus aurens, *Ham. Smith*. The Barking Deer.

Cervus affinis, *Hodgson*. The Sikkim Stag.

C. Wallichii, *Cuv*. The Kashmir Stag, or Bara Singh.

Gavoeus frontalis, *Lambert*. The Gayal.

G. Gaurus, *Ham. Smith*. The Gaur or Bison of Anglo-Indian sportsmen.

G. Sondaicus, *Muller*. The Burmese Wild Bull,

Hemitragus hylocrius, *Ogilby*. The Nilgiri Wild Goat, or "Ibex."

Gazella Benettii, *Sykes*. The Ravine Deer, Goat Antelope, or Indian Gazelle Antelope.

H. Jemlaicus, *Smith*. The Ther, or Himalayan Wild Goat.

Nemorhoedus bubalina, *Hodgson*. The Serow or Forest goat.

N. Goral, *Hardu*. The Gural, or Himalayan Chamois.

Poephagus Grunniens, *Linn*. The Yak.

Rhinoceros indicus, *Cuv*. The Great Indian Rhinoceros.

R Soudaicus, *Sol. Muller*. The Lesser Indian Rhinoceros.

R. Sumatrauns, *Cuv*. The Indian two-horned Rhinoceros.

Rucervus duvancelli, *Cuv*. The Swamp Deer.

R. Eldii, *Guthrie*. Eld's Deer, The Manipur or Burma stag.

Rusa aristotelis, *Cuv*. The Samber Deer, or Elk of Indian sportsmen.

Besides the above wild animals, the different varieties of domesticated Ox, Buffalo, and Sheep, yield horns which are collected with their hides or skins, and, indeed, these form the major part of the commercial exports of horn.

For a thorough understanding of the subject, a bit of scientific discussion will not be out of place here. The term horn is applied to the organs of attack and defence, which project from the heads of various species of animal. Anatomically they are of very various structure, and according to the late world-renowned Prof Owen, "belong to two organic systems as distinct from each other as both are from teeth. The horns of deer consist of bone, and are processes of the frontal bone ; those of the giraffe are independent bones, or "epiphyses," covered by hairy skin ; those of oxen, sheep, and antelopes are "apophyses" (or direct processes," of the frontal bone, covered by the corium (or skin) "and by a sheath of true horny material ;" those of the prong-horned antelope, consist at their bases of horny processes covered by hairy skin, and are covered by horny seaths in the rest of their extent. They thus combine the character of those of the giraffe and ordinary antelope, together with the expanded and branched form of the antlers of the deer. Only the horn of the rhinoceres is composed wholly of horny matter, and this is disposed in longitudinal fibres, so that the horns seem rather to consist of coarse bristles, coarsely matted together in the form of a more or less elongated sub-compressed cone." So called horns may thus be roughly divided into two large classes, comprising five sub-divisions :

I. Horns consisting of bone, and having no true horny matter in their structure.

(1) True processes of bone, e. g., anthers of the deer.

(2) "Epiphyses" or separate pieces of bone, covered by skin, e. g., horns of the giraffe.

II. Horns more or less consisting of true horny matter.

(1) Processes of bone covered at the base by hair, and tipped by horn, e. g., horns of the prong horned antelope.

(2) Pocesses of bone covered by horn, e. g., horns of the Ox.

(3) True horn, e. g., nasal horn of the rhinoceros.

True horny matter, found in class II, is formed by a modification of epidermal tissue (the superficial layars of the skin), and consists an albumenoid material called *keratin*.

INDUSTRIAL USES.

"*Horns of the 1st class* are extensively exported from India, which is the principal source of the supply of Great Britain. The antlers principally exported are those of the spotted Deer and the Samber Deer. Those of the latter seldom exceed 40 inches in length, and are generally under three feet, but four feet along the curvature has been recorded. They consist of a basal antler springing directly from the burr or base of the horn, and pointing forwards, upwards and outwards, the beam bifurcating at the extremity, and a snag separating posteriorly and pointing obliquely to the rear. The horns of the spotted Deer are about 30 inches in length, have a long antler sweeping upwards and backwards, with one subterminal snag, the former projecting forwards and upwards from the beam. The whole horn is pale and somewhat smooth.

Horns of the 2nd class are principally used in the manufacture of "horn" for the purposes of comb making. The keratin, of which the commercially valuable part is composed, is eminently suited to a number of purposes, owing to its elasticity, flexibility, and toughness, together with its physical property of softening under the application of heat, and its capability while in this condition of being moulded and welded into various forms under pressure. The horns of sheep and goats are whiter and more transparent than those of other animals, and are, therefore, most valued for comb making purposes, while those of the arna buffalo are the handsomest and best for more ornamental work. According to some noted authors about one-fifth of the total imports of horn into England are employed in comb making, while a small portion is converted into shoe-horns, scoops, cattle drenches, drinking cups, etc. The solid tips and the hoofs of cattle (which like horn consist largely of keratin) are made into buttons"

INDIAN USES, ETC.

Says Dr. Watt, "The chief forms of horn used in the Indian Art Industries are buffalo and bison, since there are religious objections to the use of cow horn. A cup made of rhinoceros horn is much prized by Hindus, but that material is too scarce to be of much value.

"Buffalo horn is by far the most largely employed but the least beautiful. It is made by the Indian workers in horn (*kangi-saz*) into cups, tumblers, card trays, ink-stands, combs, chains, handles for sticks, umbrellas, swords, daggers and knives, musical instruments, workboxes, powderflasks, bows and arrows, *hukka* mouth pieces, scent bottles, snuffboxes, penholders, and many other such articles. The centres of the trade are Cuttack, Monghyr, Satkhira, Jessore, Hooghly, Serampore and Calcutta, where combs, buttons, brooches, necklaces, snake bangles and the like are made. In Bhutan large horns, often richly ornamented, are used for carrying milk, and in Nepal the rhinoceros horn cups used in oblations to the Gods are produced. In Assam, Sibsagar turns out salad spoons of buffalo horn with quaint elephant handles. Of Rajputana, mention may be made of the Jaipur bows, ornamented in diaper pattern, and of the Kota veneered work. The Rajkote combs, Baroda spoons, Kathiawar knife handles and the Surat and Ahmedabad boxes veneered with horn are well known. Baroda sometimes, however, attempts articles of a higher character. One of her best workers is Jagjiben Narbheram, carpenter of Nandod, Rajpipla. The veneer

workers of Vizagapatam make very beautiful fancy boxes of buffalo-horn. Madura produces a large varieties of most admirably made and life-like animals in horn, such as, crab, scorpion, bloodsucker, bull, cobra, deer and different kinds of birds. One of the best exponents of the art is Pomusawmi Sary of Therkuvaral Street, Madura. In Mysore umbrella handles, powder boxes, buttons and other such articles are made of buffalo horn and often richly inlaid with ivory and copper. Curiously interesting moneyboxes are constructed in this way. The best makers are Ganesiya and Yusaf Ali and Sons of Mysore. In Coorg knife and *kukri* handles are made of buffalo horn.

"Bison Horn is a more artistic material than buffalo and lends itself better to treatment. In Ratnagiri and Savantvadi a fairly large trade exists in working up bison horn into ornamental wares. The Chief centres are Vijaydurg, Maban and Rajapur. The industry is said to have been started some 200 years ago at Vijaydurg. The horn is imported in small quantities from Malabar and Cochin, the price varying from Re. 1 to Rs. 2 according to size.

INDEGENOUS PROCESS.

"The process of manufacture is as follows :—A portion of horn is kept moist with cocoanut oil and heated before a fire until it becomes almost as soft as wax. This may take an hour or more. It is then worked, or pressed, into the required form, either with the hands or by means of moulds made of hard wood, and finished off with scraping tools and a small lathe. It remains to polish the whole and ornament parts of it with simple but graceful designs. The ornamentation is done in line with a fine, double-pointed steel engraving tool. The tools used in this work are indeed all extremely simple, and there are not many of them. A small, rude lathe, a fine saw, a few triangular blades, without handles, for scraping and polishing, a pair of compasses or callipers, three or four engraving tools of sizes, with perhaps a file or rasp, and moulds made for the occasion, complete the necessary equipment."

Antlers such as those of the black buck are largely made into knife and dagger handles and sometimes mounted in silver as penholders.

(*To be continued.*)

Hair Dyes and Their Demand.

I give below some useful Hair Dyes, which have gained a general renown and have been the means of a mass of fortune to the makers in England.

(1) One phial Hair dye—this dye is in great demand in India :—

Silver nitrate	1½ drachm
Nickel sulphate	6 grains
Strong ammonia solution	q. s.

Process: Dissolve silver nitrate and nickel sulphate in two ounces of distilled water, then add ammonia solution, drop by drop till the precipitate formed is completely redissolved. Now add as much water as would bring the quantity to 4 oz. Bottle this solution in a blue or an orange-yellow phial to prevent the sun rays from acting on the silver.

For use. Wash the hairs with soaps or washing soda and water to free them from traces of grease let them dry and then apply the hair dye with a brush. After the lapse of an hour wash the hairs with plain water and

apply oil of myrtle. The hairs will assume a jet black hue.

(2) 2 phial Hair dye This too is largely used in India.

Phial No. 1.—(1) acid pyro (pyrogallic) 30 grains

(2) Soda met sulphate 10 grains

(3) Aqua distilled or rose water 2 oz.

Phial No. 2.—(4) Silver nitrate 20 gr.

(5) Liquor ammonia q. s.

(6) Water, distilled 2 oz.

Process : First of all dissolve silver nitrate in ½ an oz. of water then add as much ammonia as would redissolve the precipitate formed. After this add 1½ oz of more water to bring the whole quantity to 2 oz : Bottle this up in a blue phial and label it now.

Now in another phial, 2 oz capacity, mix No. 1, 2, 3 and label it No. 1.

Both the phial No. 1 and 2 may be packed in a card board box for trade. Two brushes one with a black handle for No. 2 phial and the other with a white handle for No. 1 phial should also be packed in the card board box to facilitate a ready application of the dye.

Use : wash the hairs with soap or soda-solution as previously directed, when dry take in a saucer a little quantity of dye from phial No. 1 and apply with white handle brush immediately after apply dye from No. 2 phial with the black handle brush, taking the dye in a separate saucer or small china cup. Care should be taken not to throw any drop of dye on the skin, if it accidently falls or touches the skin it may be removed with a tuft of cotton dipped in a solution of salt and water.

After 2 or 3 hours wash the hairs again to free them from the dye and apply oil of myrtle. If the dye is used at night before going to bed and washed out in the morning the color would be deeper and more lasting.

(3) 3 phial Hair dye. This dye is faster in color than the 2 described above :

Phial 1	Acid pyro.	12 gr.
	Spirit rectified	4 dr.
	Aqua distilled	10 dr.
Phial 2	Silver nitrate	20 gr.
	Liquor ammonia	q. s.
	Aqua distilled	2 oz.
Phial 3	Soda Hypo sulphite	8 qr.
	Aqua distilled	1 oz.

Process—Mix ingredients No 1, 2. and 3 in a 2 oz phial and label it No. 1.

In another phial also of 2 oz. capacity prepare ingredients 4, 5 and 6, as per direction given in foregoing recipes.

Mix ingredients 7 and 8 in a 1 oz phial.

Use: Wash the hairs as directed before and apply dye No. 1 with a brush and comb the hairs, after 5 minutes apply No. 2 dye and comb the hairs, after another 10 minutes apply No. 3 dye, after 3 hours wash the hairs with soap and warm water and apply oil of myrtle as usual.

Below I give a couple of Indian Hair Dyes which are in no wise inferior to the English dyes described above. These were in general use before the English dyes were imported in to India.

TURKISH HAIR DYE.

1. Gall-nuts 4 parts.
2. Cuprie oxide 2 parts.
3. Sal ammoniac or chloride of ammonium 1 part.
4. Alum ½ „

Process: Roast the gall-nuts in hot sand or in the hot ashes of an oven, then grind the nuts and other ingredients in an iron pan. When pulverized thoroughly, mix vinolia lotion and grind again with an iron mortar, when the lotion is thorougly incor-

porated the dye is ready for use. The hairs should be washed with vinolia water or lotion and the dye prepared above applied. After one hour wash the dye off with vinolia oil or myrtle oil.

Vinolia water or lotion is prepared by steeping in water (called macnration) briused vinolia nuts called *kainla* or *kobla* for 12 hours, then straiming the water. The prepared water will assume a darkish color.

HINDI HAIR DYE.

1.	Raw mangoes	20
2.	Gall-nuts	5 tolas
3	Iron-filings	5 "
4.	Sulphur	5 "
3.	Sour pomegranate	20 "
6.	Sessamum oil	60 "

Process. Pound ingredients 1 to 5 and put in an old earthen pot, over it put the quantity of oil and stir the contents well with a stick;then cover the pot with a lid and tie the neck with a piece of coarse cloth and bung it in a heap of horse dung (excreta) for 40 days, after this period the dye will be ready for straining, bottling and use. It may be used with a comb or with hands like the ordinary dressing hair oil: colour jet black and shinning.

UNANI HAIR DYE.

Pulverized indigo leaves	1 part.
" Myrtle leaves	¼ part.

Mix the above together and kneed in vinolia water and place in the sun for ½ an hour. Dye is ready for use wash : the hairs as directed and apply the dye tying the hairs with castor plant leaves ; after 2 hours wash the hair with water and apply an scented oil.

Note.—The dye should be rendered to the consistency of paste before application.

G. N. MYTU.

Small Trades & Recipes.

CHEMICAL GUANO.

Calcium nitrate	200 parts
Potassium nitrate	50 "
Potassium phosphate	50 "
Magnesium sulphate	50 "

Mix. Dissolve from 4 to 10 grams of this powder in one litre of water, and water each pot plant with this once or twice a month. The plants must be in full vegetation.

POULTRY FOOD.

Phosphate of lime	8 ozs.
Sulphate of iron	8 "
Powdered capsicum	8 "
" fenugreek	4 "
" black pepper	2 "
" lentils	12 "
Silver sand	4 "

Powder each separately and mix throughly. The powder is used to increase the egg-laying powder of hens. A tablespoonful is to be mixed with sufficient food for twenty hens.

ALLOY FOR MATHEMATICAL INSTRUMENTS.

Copper	180 parts.
Zinc	4 "
Tin	16 "

Melt the copper at first in a crucible. When melted throw in the zinc. When mixed, throw in the tin. Cast into moulds previously oiled.

FRENCH POLISH REVIVER.

Naptha	8 lbs.
Shellac	32 ozs.
Oxalic acid	2 "

Let it stand till dissolved; then add 24 ozs. linseed oil.

WHITE PENCIL FOR SKETCHING ON GLASS.

Zinc white	80 parts.
White wax	40 „
Tallow	20 „

Melt the tallow and wax in a waterbath. Then thoroughly incorporate the pigment. When cold, transfer the mass to the press, in which it is treated and shaped similarly as the graphite in the presses for ordinary pencils.

ARTIFICIAL GRAPE SYRUP.

Best brandy	2 pints.
Tincture Lemon	2 ozs.
„ cudbear	4 ozs.
Simple syrup	4 gallons.

Mix and bottle. May be used like the genuine syrup.

CEMENT FOR SETTING BRISTLES IN HAIR BRUSHES.

Rosin	4 parts
Yellow wax	4 „
Burnt ochre	4 „

Melt the rosin with the wax and stir in the ochre which should be in a very fine state of division. Keep the mass heated to a fluid state until ready to pour into the form.

LINEN POLISHING BLOCK.

Bleached carnauba wax	60 lbs.
Powdered French chalk	42 „
„ white castile soap	24 „
Oil citronella	5 ozs.

Convert the soap and wax into shavings, melting at a gentle heat; when a little cool, stir in the chalk and the oil. Then pour out into a mould to set.

Questions & Answers.

Dealers in Tin Boxes.

Mr. B. D. O., Hoshiarpur, writes: Will you kindly give me the addresses of Dealers in Tin boxes?

Please write to the following firms mentioning INDUSTRY:—(1) The Darpan Beopar Co., Cawnpur. (2) Messrs Burgoyne, Burbidges & Co., 16, Coleman St., London. (3) AI Air Tight Tin Box Co., High St., Stratford, London, E. (4) F. Jarman & Co. 3, St. James Place, Aldgate, London, E. C. (5) E. C. Barlow & Son, Urswick Road, Hackney, London, N. E. (6) F. Ginzler & Co., 7, Love Lane, Shadwell, London, E. (7) R. A. Newley, 24, Stockwell Green, London, S. W. (8) C. Palmer, 66, Sclatter St., Benthal Green, London, E. (9) Wicks Bros., Camp Road, Mousehold, Norwich, England.

Books on Dynamos.

M. A. K., Agri. College, Lyallpur, writes: Will you kindly give me some names of books on the construction and working of dynamos?

The following books may be of use to you:—(1) Dynamo Building for Amateurs, by A. J. Weed, 50 cents. (2) Electric Toy making, Dynamo building, and Electric Motor construction, by T. O Conor Sloane. Rs. 3 15-0 (3) Electricians' Handy Book, by the same, Rs. 14. (4) Dynamo Electric Machinery, 2 vols. by S. Sheldon and others. Net 24 S. (5) Dynamos. By T. Sewell. Rs. 5 10 0. (6) A. B. C. of Dynamo Design, by A. H. Avery, Rs. 1-12. (7) The Dynamo, by S. R. Bottone, Rs 1-14. (8) Modern Dynamos and Batteries, by the same, Rs. 2-3. (9) How to manage a Dynamo, by the same, As. 12-0. (10) How to make a Dynamo, by A. Crofts,

Rs. 1-8. (11) The Dynamo, by Hawkins. and Wallis, Rs. 11-14. (12) Hobart and Ellis, High speed Dynamo Electric Machinery, Rs. 22-5. (13) Management of Dynamos, by G. W. Lummis-Paterson, Rs. 3-15-0, (14) Designs for small Dynamos and Motors. by C. P. Pork, Rs. 7 7. (15) Dynamo Design : theory and Practice, by A. Press, Rs. 7-7-0. (16) Design of Dynamos, by S. P. Thomson, Rs. 18-6-0. (17) Dynamo Electric Machinery, by the same 2 vols Rs. 52-8. (18) Dynamo Construction, by J W Urquhart Rs 5-10-0. (19) Practical Dynamo, By Mar hall As. 14-0. (20) Dynamo by W. R. Bowker, Rs. 5-10.

Dealers in Button making machines.

Mr. C. L. Marddu and L B G Kakadanga, write :—Will you kindly state where to get button manufacturing machines ?

A hand button-making machine is sold by Royffe & Co, 35 Curtain Road, London E. C., price complete £2-10. Button or Stud parts ready for covering are supplied by the same firm at 5d. per gross. More elaborate machines for making large quantities are made by C A Harnden & Co., Cooper St. Hyde, near Manchester. Other firms are : Bradley and Craven Wakefield, England. (4) Waterbury Farrel Foundary and Machine Co. Waterbury Coun., U S A. (5) John Waldron Co, New Brunswick, N. J., U. S. A. (6) Buttonhole and Button Sewing machinery can be had from Standard Sewing Machine Co. Cleveland, Ohio, U. S. A.

Dealers in Enamel ware.

(Illegible), writes : Will you kindly state where to get Enamel ware ?

Kindly write to the following firms mentioning Industry : (1) W. Garfield, Ltd., Earnest St., Birmingham. (2) Davies Bros & Co Ltd., Crowm Works, Wolverhampton. (3) J. and J. Siddons, Ltd., West Bronwich.

Pain Balm or Household Embrocation.

Dr. S. K. Row, Chidambaram, writes : Kindly give a formula for Pain Balm.

A household embrocation can be made by dissolving camphor 22 grs. in methylated spirit 6 grs., and then thoroughly mixing with dilute acetic acid, 2½ ozs. ; one-fourth part of the yolk of an egg, and 6 ozs. of best turpenting Cork well.

Dealers in Incubators.

Manager, "The Khalsa Advocate," Amritsar, writes : will you please let me know where to get Incubators.

Kindly write to the following firms mentioning INDUSTRY :—(1) D. Johnson, Battersea Works, Hayes, Middlesex, England. (2) J. Penketh, 22, Market Place, Manchester, England. (3) W. Tambu, Twickenham, London. (4) E. Spencer & Co., Aldgate, London. (5) Star Incubator and Brooder Co., Dep. E. Bound Brook, N. J., U. S. A. (6) Reliable Incubator Brooder Co., Box B 230, Quincy, Ill., U. S. A.

Methyl Iodide.

M. H. P. G., Banganapelle, writes : What is the sp. gr. of methyl Iodide and what are its uses ?

The sp. gr. of Methyl Iodide at 15° is 2.293. It boils at 45°. If you know chemistry, you will be able to understand us. It is one of the alkyl halides. In their action upon silver nitrate the alkyl halides differ very much from the halides of the metals. In aqueous or alcoholic solution the latter at once yield a ppt. of silver halide, the reaction being quantitative. On the other hand, silver nitrate either does not ppt.

silver halide from a solution of the alkyl halides, or the reaction only takes place slowly. The alkyl halides can be converted into one another ; e. g., alkyl iodides can be obtained by heating the corresponding chlorides with potassium or calcium iodide. These reactions are often incomplete. The alkyl iodides are chiefly used for introducing alkyl groups into organic compounds. Hence, by acting with various substances methyl iodide yields such complicated products as methylphenylhydrazine, monomethylaniline; methyl picrate, toluene, etc. Methyliodide is also used as a test for pyridine. Many alkaloids yield addition-products with methyl iodide.

Books on Carpet Weaving.

The same gentleman asks names of books on carpet weaving.

The following books may be of help to you :—(1) Carpet manufacture, by Bradbury, Rs. 10. (2) A monograph on Carpet Weaving in Bengal, by N. G. Mukherjee, As. 4. (3) Monograph on Carpet making in the U. Prov., by Prasad, Rs. 3-8. (4) The Oriental Rug, by W. D. Ellwager, Rs. 10-15. (5) The Oriental Rug Book, by M. C. Ripley, Rs. 9-3.

Books on Brick and Tile Manufactures.

The same gentleman asks names of books on Brick and Tile making.

The following books will help you :—(1) Architectural Pottery, Bricks, Tiles etc., by L. Lefeure, Rs. 13-2. (2) A Treatise on the manufacture of Bricks and Tiles, by E. Dobson, Rs. 2-4. (3) Practical Bricklaying, by A. Hammond, Rs. 4-8. (4) Bricks and Brick making, by Hasluck, As. 8.

Dealers in Brick and Tile Making Machinery.

T. A. (Illegible), Tanjore, writes : Please give the names and addresses of dealers in Brick and Tile making machinery.

Perhaps you have received our reply by post. Kindly write to the following firms, mentioning "Industry" :—(1) Bennet and Sayer, Derby. (2) Bradley and Craven, Wakefield. (3) Brightside Foundry and Engineering Co., Wicker Iron Works, Sheffield. (4) Horsefall Destructor Co., Whitehall Road, Leeds. (5) Mackies Ltd., Caversham Road, Reading. (6) Thompson and Southwick Jamworth, Staffordshire. (7) Sutchiffe Spackman & Co., Leigh, Lanchashire. (8) Wooten Bros., Coalvilla, near Leicester. (9) Charles Whittaker & Co., Aerington. (10) Clayton Howlett & Co., 28, Victoria Street, Westminister, all of England. (11) Naylor Bros., Peekskill, N. Y. (12) C. W. Raymond Co., Dayton, Ohio. (13) Chambers Bros. Co., Philadelphia, Pa. (14) Bonnot Co., Canton, Ohio. (15) Anderson Foundry & Machine Works, Anderson, Ind. (16) American Clay Machinery Co., Bucyms, O. All of U. S. A.

To Polish Marble or Stone.

M. H. P. G., Banganapalle, writes : How is marble or stone polished ?

A very high authority gives the following directions :—"If the piece to be polished is a plane surface, it is first rubbed by means of another piece of marble, or hard stone, with the intervention of water and two sorts of sand ; first with the finest river or drift sand, and then with common house or white sand, which latter leaves the surface sufficiently smooth for the process of gritting. Three sorts of grit stone are employed : first, Newcastle grit ; second, a

fine grit brought from the neighbourhood of Leeds; and lastly, a still finer, called snake grit, produced at Ayr, in Scotland. These are rubbed successively on the surface with water alone; by these means, the surface is gradually reduced to closeness of texture, fitting it for the process of glazing, which is performed by means of a wooden block having a thick piece of woolen stuff wound tightly round it; the interstices of the fibres of this are filled with prepared putty powder (peroxide of tin, and moistened with water; this beiug laid on the marble and loaded, it is drawn up and down the marble by means of a handle, being occasionally wetted, until the desired gloss is produced.

Cotton Carpet Manufacturers.

With reference to the query of J. D. J., Ceylon, on page 230 of Decr. issue, Mr. P. S. R., Salem, has kindly sent us the following addresses :—

1 Mysore Spinning & Manufacturing Co., Ltd., Bangalore. 2. Technical Institute, Nagarcoil. 3. Govt. Industrial School, Mysore. 4. The Oriental Carpet Factory, Delhi. 5. Ishwar Dass & Sons, Carpet Factory, Amritsar. (6) Maiden & Co's Carpet Factory, Masulipatam. 7. M. Ethirajullu Pillai & Co., Bezwada. 8. The Oriental Carpet Manufacturing Co., Ellore. 9 C. Gopalaswami Naidu & Sons, Tuticorin. 10. The Nadiad Silk, Wollen and Cotton hand loomweaving Co., Ltd., Nadiad 11. Central Jail, Vellore. 12. Central Jail, Bangalore. Mr. P. S. Rajam, 120, 2nd Agraharam, Salem, is prepared to send by V. P. P. the famous Salem Fast dyed cotton carpets on a small commission. Intending purchasers may send a trial order before buying elsewhere.

Tooth Powder.

Dr. M. M. M., Itinda, and others, write : Please give a formula for rose scented and rosy coloured tooth powder.

Various recipes have already appeared. However, we give here two others (1) Sugar 400 parts; cream of tartar, 800 parts; magnesia carbonate, 800 parts; cinnamon, 64 parts; mace, 32 parts; sulphate of quinine, 32 parts; carmine, 34 parts, scent with oil of rose and a little oil of peppermint. (2) Dr. Piesse & Lubins' Formula is :—Pptd. chalk, 4 lbs, orris powder, 4 lbs., carimine, 2 drs.; sugar, 1 lb.; otto of roses and neroli, of each, 4 drs.

Essence of Jesmine

M. C. D., Kamrup, writes: what substances are required to increase the strength of jesamine ?

First of all prepare Jasmine pomade by the process of *enflurage*. Take 8 ozs. of that pomade and 8 ozs. of perfumer's alcohol. Introduce the pomade and alcohol into a Mason fruit jar of 2 pint capacity. Digest by means of a water bath until the pomade is barely melted; Shake well together, and repeat the shaking frequently until cold Allow this to stand 30 days, then drain off the essence. If this falls sort of 8 ozs., repeat with a sufficient quantity of alcohol to make up that measure. The washing can be continued, and a second 8 oz. of essence obtained, although, much weaker, may be found useful in a cheaper grade of perfumes. Now take the 8 ozs. of essence of jasmine prepared in the above manner and mix with it one oz. of tincture of vanilla and 4 drams of tincture of ambergris. The essence prepared in that manner will be superior to ordinary essences of the market.

Leaderettes.

A New Method of Etching Glass

A very easy formula has been patented in America by which one can stamp the designs on glass as in the case of rubber stamps, i. e. any number of designs may be made into rubber stamps. The "etching ink" is poured upon the pad and stamped as usual. This method does away with the tedious process of applying resist, scratch-in , etc. It as also advantageous where the same design is to be made upon a large number of articles. In case the stamp is not made, the fluid may be used as in the case of ordinary etching, i. e. by applying the resist upon the article, then scratching out the design and dipping the article in the solution. The fluid is made thus: Dissolve 2 ozs. of sodium floride (cost 10 as.) in 50 ozs of water and then add 20 drams of acetic acid (cost 6 pies.)

The Culture of Indian Silks.

Now that the struggle for existence is becoming more and more keen day by day, we would draw the attention of our readers to an industry that has hitherto been greatly neglected or carried on in a haphazard manner, in many parts of the country, and which if duly developed, will provide ample employment for all classes of the people in addition to increasing the wealth of India to an unlimited extent. This industry within the reach of all classes, high and low, educated and uneducated, is the culture of the wild silks of India, three of which, that of the Tasar, Eri and Muga, are in ever increasing demand for their durability and cheapness. It is an industry, well calculated, through its simplicity, to become a domestic institution, throughout the length and breadth of this wonderful country, for it has been proved to be independent of all methods of culture, but that provided by nature in various species of wild jungle trees. It thus does not even require the cultivation of the mulberry on which Chinese and Japanese silk worms are fed, so that no great outlay of expenditure be incurred in the provision of food. The cultivation of the Eri silkworm will probably prove the more valuable of the three, being of a pure white colour capable of easily taking an dye. Its food is found all over India and the worm has already been domesticated and its silk vastly improved in quantity and quality, of late years, in the Madras Precidency. The cultivation of these silks, in addition to others locally known, it is not too much to say, may eventually revolutionise the cottage industries of India. But not only this. It is found that the empty Cocoons of the worms, that are now left to rot in the trees in the jungle, can be converted into plush so that nothing need be wasted and their collection can be used as a means of giving wage-earning employment for the women and children of the labouring and agticultural classes in the time of scarcity or famine with which a large portion of India suffers to a greater or lesser extent every year. The increase in the manufacture of machinery for winding, reeling and weaving into cloth of the silks that will be produced, if the proposed domestic culture of the wild silks of India is carried out need hardly be enlarged upon, or as shadowed forth above the great opportunities that will be afforded for useful and remunerative employment for large numbers of the educated classes who now take to *keranigiri* as the sole means of salvation for want of something else to do. We shall revert to this interesting subject in our future issues.

Brief Queries & Answers.

Roll No. 392, Jubbulpore.—Kindly communicate with Mr. H. James, 69 Queen's Road, Delhi. for information about tanning.

B. R. J., Bombay.—Can any one give him the addresses of foreign journals on Trade and Commerce. (2) Books on Gardening have already appeared.

M P., Jhansi.—Is there any solution by which pieces of ebonite can be joined? (2) Probably Messrs Hall and Anderson of Calcutta may undertake to manufacture the hats

L. Barpatra Gohan, Kakadanga Assam.—(1) Melting of iron and steel will be easier if done on a large scale (2) Wants addresses of firms which deal in moulds and machineries for making penknives, razors etc.

Roll No. 269.—For clock makers' machinery please write to Kopfer Jos. & Sohne, Furtwangen (Bad. Schwazwald), Germany. For watch making machinery write to B. Burkle Me Du Mole, 40, Geneva Switzerland. Watch glass can be had from St Louis School, St. Louis, Mo., U. S. A., and Kister, C, place de comavin, 2, Geneva, Switzerland. Watch and Clock springs can be got from Mader Auton & Co., Ausburg Luhhansen, and Plaff and Schlander, Schramburg, Wutenburg, Germany. (2) Asks how to utilize matha (the butterless watery portion of curd)? (3) For Japan Commodities see an announcement further on.

S. N B., Uttarpara.—For advertising novelties please write to The Ketterlinus Lithographic Mfg. Co., 4th and Arech Sts, Philadelphia, Penn., U. S. A. (2) Any kind of Guano and bonemeal are the best fertilizers for rose plants.

Roll No 3809, Bezwada.—We do not know whether nickel plating to iron can be done without the battery (2) Make the iron or steel bright by sandpapering and immediately immerse in a concentrated solution of copper sulphate. (3) Wants to buy cellulose

Manager, Balram Press, Raj Nandgaon.—For the battery please write to the Dry Battery Co., Bari Dholpur.

S. G.. Trichur.—For coir fibre machinery please write to Earnest Lebmann, Machester, England. For pump please write to Messrs Jessop & Co., of Calcutta.

H. T. M., Bombay.—Thanks for the recipes, but they have already appeared.

M. B. B., Laban.—Consult the Directory of Technical Institutions in India. Its price is Re. 1-4. It can be had from the office of the Indian Industrial Conference, Amraoti, Berar.

J. R. V. Karachi—Wants comprehensive information about the paper industry of India.

M A. Pillai, Udamalpetai.—Wants to know how buttons are manufactured from cocoanut shells and pearls?

Krishna Dass, Chunar.—Informs that a company has been started under the name of Embroidered Card Mfg. Co., which is searching buyers of velvet and silk cards. (2) He wants to know also where to get all sorts of silk ribbons, laces, cords, velvet, gold and silver threads? (3) Wants to know whether there is any Mantle Mfg. Co, in India? If not, what capital is required for starting the same? (4) Asks if any one has got "Gnom" or "Invictor" machines in India? What is their experience with them?

Gokuldas Purushotham, Cochin.—Wants buyers of garnet sands, of Cape Comorin, used for polishing gold and silver articles and for making artificial rubies.

S. P, Mamargudi.—For dynamos please write to Siemmens Bros. Dynamo Co., Ltd., of London. They have agencies of the same name in Calcutta, Madras and other places

P. G. Jariwala, Rampoora, Surat.—Informs the various querists that he can supply Gota or Kinari machines,

Roll No 3558.—Wants to know whether there is any machine for taking out dotted spots and vertical stripes from socks manufactured on hand circular knitting machine? (2) Please consult the Directory of Indian Goods and Industries, priced at Re. 1-8. (3) Where to get machines for making fancy neckties having beautiful designs. (4) Wants an illustrated article on the knitting business. Cannot any of readers kindly write one, which if accepted, will be paid for?

H. L. M, Rohtak.—The book to suit you is sealing waxes, wafers and other adhesives, by H. C. Standage, priced at Rs. 4 6.

Sapat & Co., Bombay.—Various methods of deodorizing cocoanut and sesamum oils have already appeared. Have you tried any one of them?

Pranlal Bros & Co., Bhavnagar.—Kindly communicate with H C/o Industry for yonr requirements. He will explain to you the article on Inks for stamps and other things.

K. E. S. I., Kumarapuram.—Wants buyers of papads. (2) The address of V. N. is V. Nadarajah, Nudugoda, Undugoda, Ceylon.

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The Manurial Wealth of India.

The manurial wealth of India may be divided into three classes—Animal, Vegetable, and Mineral. Among animal manures the following are the chief :—Farmyard manure town refuse, animal refuse, bones, and guano.

Though farmyard manure is used to some extent, but it is collected in a negligent way. Its value as manure is too well known. But in this connection we wish to draw the attention of our readers to the remarks of Mr. W. R. Clark. "The improved sanitation of India," he says, " which has to such an extent checked the outbreak and spread of the epidemics that were wont to decimate the people, and has thus been instrumental in increasing the population, loses its chief merits if concident poverty takes place through deficient food supply. If the food produced in the country (through expansion of cultivation and improvement in yield) is to keep pace in its increase with the increasing population, all practices that tend to lessen the food producing powers of the land should be checked, and none more necessarily so than the burning of cow dung as fuel, a custom which deprives the agriculturist of his cheapest and most easily available source of manure." As regards night soil and town refuse, the religious prejudice of the agriculturists are a great bar to its extended use. But this must be a serious loss to the country, ' since we may roughly calculate that the solid and liquid excreta of each individual, produce per annum about 6 lbs. of ammonia and 3 lbs. of phosphates." What that means is clear enough and needs no comment. Animal refuse includes the blood, offal and bones of cattle and sheep which are slaughtered, the carcasses of domesticated and wild animals that die, and fish. These materials constitute another largely neglected means of preserving the fertility of the land. Slaughter house refuse is a highly nitrogenised manure, and would therefore, be specially good for crops like sugarcane and maize. Although large quantities of fish oil are manufactured, the refuse from which, if properly conserved and utilized would form an invaluable substitute for guano. Very occasionally in Bengal only a manure of rotten fish is applied to the roots of trees. As to the manurial value of bones we have already sta-

ted it in the July issue. The importation of guano is gradually increasing every year. It owes its value to the ammonia, phosphates, potash and soda it contains, as well as other constituents of plants in small quantities, but in a readily available condition. What a large amount of wealth is lying idle cannot be imagined: the bat guano of the caves in the Kurnool district, in Moulmein, and near Vizagapatam, and the bird guano in the Nicobar and Andaman Islands are simply inexhaustible and yet no one cares for their proper utilization. Bat and bird guanos has been extensively used by Chinese agriculturists in the Malay Peninsula in the cultivation of the cocoanut, nutmeg, clove, and betle vine with good success, and it seems strange that the extensive supplies of this substance in India, alluded to above, are not made use of. Though vegetable manures are used in India, but the method of collection and maturation are in a very backward state.

Vegetable manures include green manures (of which 15 principal plants only), burning of soil—jumming or rabbing, set or indigo vat refuse, green soiling, and oil cakes, of which there are eleven principal ones in number. Green manures may be utilized for paddy fields The refuse from indigo vats is thought a particularly valuable manure for the cultivation of tobacco. Green soiling is very little practised but its value is enormous. The oil cakes include linseed cake, poppy cake, til cake, groundnut cake, castor cake, cocoanut cake, niger seed cake, and hemp cake, each of which has a special value of its own. Until more oil pressing and refining mills are not established, there is very little chance of bringing down the high prices of these oil-cakes.

Mineral manures are not used in India generally, although large quantities are available. These includes lime, gypsum, nitrates, salt, coprolite, ammoniacal liquor, and other mineral substances such as commercial ferrous sulphate, basic slag, the carbonates of soda and potash, etc. As a manure for leguminous crops, lime and gypsum are very valuable but they require judicious application. Until the cost of lime burning is decreased there is very little chance of its being used as a manure. Where does the refuse from the soda water manufactories of large towns go? Surely it can be obtained at much less cost than pure gypsum if the high railway freight is decreased. The refuse contains not only the pure sulphate of calcium, but also calcium carbonate, various chlorides, sulphates, and sulphurets of calcium and sodium, and so the manurial value of the mixture cannot be ignored. The nitrates of potash and soda are used on account of the nitrogen they contain, although nitrate of potash is valuable also from the potash that it can supply to the plants. The price of nitrate of potash, however, renders it impossible that it can compete as a manure with the crude nitrate of soda from South America, inspite of the greater manurial value of the potash salt. The manufacture of saltpetre can only be conducted under liceuse, for which an annual fee is charged, prevent its use as a manure. Until the fiscal restriction is removed, at any rate in favour of the cultivators, we cannot hope to see its use as manure generally. As to salt or chloride of sodium, it is generally used as an auxiliary with lime or the nitrates. Heavy dressings of salt are often applied to pasture land to improve the herbage and destroy insect pests. Salt is also used to

prevent the too ·apid ‹ecomposition of manures, a purpose which may be beneficially used in a country like India where farmyard manure is so ·apidiy decomposed that in a few months becomes a fine mould,although ·ve y valuable, does not answer the purposes of the ordinary article. The high price of salt is serious drawback to its use. We cannot expect its general introduction among the agriculturists until some means of denaturalisation, like methylated spirit, is discovered so as to render it unfit for human consumption, while it remains fit for use by cattle and as manure. Various substances have been tried and a large reward offered by Government to attain this end, but as yet all the methods tried have · ee unsuccessful, pure salt being easily recovered from the preparations. The methods used in Germany, where salt for manure is issued duty free mixed with charcoal, dust, ashes, soot in different proportions, although effective there, wou d not be so in India, where the salt dutv is much heavier, and cheaper means of restoration exist. As to coprolite, Dr. Clark, from whose remarkable article the above notes are culled says that " the name was originally applied ‹y Dr Buckland to substances found in many geological strata which he believes to be the dung of fossil animals. Its signification has however, now been widened to include also other phosphatic concretions. Coprolite has been discovered : t Mussourie and fossil bones in the alluvium of the Jumna. If these contain, as was sai on their discovery, more than 50 per cent. of tri-calcic phosphate, and the supply is abundant as is anticipated, the use of the superphosphate of lime as a manure in India may be hoped to become more general. It appears indubitable that the greater part of Masuri rock is at an‹ rate as valuable as the Cambridge coprolite strata. The desiderata of cheap carriage and a cheap supply o crude sulphuric acid to convert the tribasic into the soluble phosphate at present alone ‹urtail its use. Should these met, here is no doubt, that a c›nsiderable in‹lustry in this form of mineral manure would arise."

The ammoniacal liquor of gas works is another good manure for vegetables, as we hav previously id elsewhere, which ought to be utilised wherever available.

As to other mineral ma·ures, they a·e either not available, or the cost at which they can be obtained ‹reeludes their use by our agriculturists.

These then include the manurial wealth of India and our readers will see that almost all the manures can be obtained here and that we need not go to foreign markets for enriching them.

Horns and Horn Work.

(*Concluded from page 265.*)

COMB MAKING.

Spon, in his Encyclopædia, gives the following process :for the preparation of horns for ‹omb making :—" Horns which are to be manufactured are first thrown into water by which means slight putrefaction is caused. ·mmonia is liberated, and the horn begins to soften ; the softening is then continued by immersion in an acid bath,for a period of about two weeks. When sufficiently soft they are cleaned and split into two parts by a circular saw. These slices are introduced between heated plates, and the whole is subjected to a pressure of several tons a square inch. The plate may bear devices, or be of varying form, thus producing at once any

desired effect. The horn may then be dyed black or brown by dipping into a bath containing a weak solution of mercury or lead salts and rubbing by hydrosulphte of ammonia; or it may be mordanted in a iron bath and dyed by logwood. Fancy markings are produced by immersing the horn in a bath of lead salt and then in hydrochloric acid, thus forming white lines in the interstices of the horn.

"The manufacture of combs is by far the most important application of horn. The laminatory character of the horn, its very diversely running grain, and the raising up of the fibres by the use of the various tools, render it very difficult to apply machinery in its conversion, and the large amount of hand labour required helps to cause the proportionately high price of the manufactured article. The softened horn is first split lengthwise in the direction of the grain, it is then warmed in hot water, laid out flat, between cold iron plates and pressed level. If the goods are to be subsequently stained, the slices are further placed between hot steel plates, and very strongly pressed to reduce the thickness and destroy the superficial grain. The prepared slices are next stamped out by cutters, arranged to form as many combs as possible, of various sizes and shapes so as to fully economize the the material. The slices are again pressed, straightened and ground, ready for cutting the teeth, which operation is performsd by a "parting engine," or die-stamping machine, in the case of coarse combs, and by circular saws in that of fine-toothed combs.

OTHER KINDRED PROCESSES.

BLEACHING.—Only the light coloured horns can be bleached. To bleach them white, try soaking in ammonia solution and then in hydrogen peroxide.

BUFFALO HORNS.—To colour the brown streaks black on buffalo horns, after they have been polished, apply a dilute solution of nitrate of silver with a brush or rag several times, until the desired intensity is obtained. Allow it to dry in the sun after each application before applying the next coat. Polish when sufficiently black.

SOFTENING HORN.—The bony core of the horn is first removed; the next process is to cut off with a saw the tip of the horn, i.e., the whole of its solid part, which is used by culters for knife handles and sundry other purposes. The remainder of the horn is left entire, or is sawn across into lengths, according to the use to which it is destined. Next, it is immersed in boiling water for half an hour by which it is softened, and while still hot is held in the flame of a coal or wood fire, taking care to bring the inside as well as the outside of the horn, if from an old animal, in contact with the blaze. It is kept there till it acquires the temperature of molten lead, or thereabout, and in consequence becomes very soft. In this state it is slit lengthwise by a strong pointed knife, like a pruning knife, and by means of two pairs of pincers, applied on to each edge of the slit, the cylinder is opened nearly flat. The degree of compression is regulated by the use to which the horn is afterward to be put. When it is intended for leaves of lanterns the pressure is to be sufficiently strong "to break the grain," by which is meant separating in a slight degree the laminæ of which it is composed, so as to allow the round-pointed knife to be introduced between them, in order to effect a complete separation. Horn for knife handles is sawn into blanks, slit, pared, and partially shaped, then heated in water and pressed between dies. It is afterwards scraped, buffed and polished.

WELDING HORN.—Pieces of horn may be joined by heating the edges until they are quite soft and pressing them together until they are col .

POLISHING COWS' HORNS.—Rasp the horn with a file until the surface is smooth ; then scrape with glass until there is a fine, clean surface. Rub with a cloth and putty powder, wet to a paste with water. Polish with a cloth and oxide of tin, wet with water to a paste. Handles for razors, knives,and silver articles, when moulded are scraped, and then buffed with fine sand and oil and afterward with rotten stone and oil.

POLISHING OTHER KINDS OF HORN —(1) Use finely ground pumice stone and water, applied with a felt polishing wheel ; finish with rotten stone in the same way. (2) Having scraped the work perfectly smooth and level, rub it with very fine sand-paper, repeat the rubbing with a bit of felt dipped in finel powder charcoal with water, a d lastly with rotten stone or putty powder, and finish with a piece of soft wash leather damped with a little sweet oil ; or, still better, rub it with subnitrate of bismuth by the palm of the hand.

COLOURING LIGHT HORN IN IMITATION OF TORTOISE SHELL.—Make a mixture of equal parts of burnt lime, carbonate of potash, oxide of iron, and powdered graphite, rub all the ingredients thoroughly together, and add enough water to make them into a thin paste. The horn, polished to a finish, is dipped for a short time in warm dilute nitric acid,and then laid in cold water, then dried, and after a time the above paste is applied to the parts to be coloured brown by means of a small pad of wadding, the paste being allowed to remain on the parts for 2 or more hours, according to the shade required. After this time the paste is removed by means of a stick, the horn is washed off and left for 8 to 10 hours. Finally, it is polished with soft soap and Vienna lime.

STAINING HORN.

BLACK.—After having fine sand-papered the horns dissolve 50 to 60 grains of nitrate of silver in 1 oz, of distilled water. Dip a small brush in, and paint the horns where they are to be black. When dry, put them in the bright sunshine, and you will find that they will turn jet black. When done, polish off.

BLUE.—Stain green, and then steep for a short time in a weak solution of sulphate of indigo, containing a little cream of tartar.

BROWN.—Immerse in aqueous solution of potassium ferrocyanide, dry, and treat with a hot dilute solution of sulphate of copper.

GREEN.—Dissolve 8·4 drams of copper turnings in 26 drams of nitric acid Don't inhale the fumes Dip the articles in this solution until they assume the desired tint.

PURPLE.—Use a strong aqueous solution of chloride of gold

RED.—Soak in very dilute nitric acid for a few minutes and apply a strong infusion of cochineal in aqua ammonia.

YELLOW.—Steep them in a solution of lead acetate, and then after drying in a solution of bichromate of potash.

TRADE.

As before said,the export trade is large and important. No date of the present time is available separately. The minimum export, in 1886-87, was 48,435 cwt., valued at Rs. 12,27,082, and the maximum in 1887-88, was 68,018 cwt., valued at Rs. 16,41,937. We believe the figures have gone very high since that time. The countries which form the chief markets for India's horns, are France, the U. Kingdom, and the Strait Settlements, but returns shew a small though fairly steady trade with Belgium, Italy,

Egypt, Germany, Austria, Ceylon and China, named in order of importance. The approximate value of the different classes of horns in England in the last eighties were : East Indian deer, 40 to 120S a cwt., East Indian buffalo, 20 to 60S ; Tips (consisting of solid horn for the manufacture of buttons, etc.,) 18 to 40S.

We import also a small quantity of horns from Ceylon, Zanzibar, and Mozambique. The East African horns are valuable than those of Ceylon. Some portion of the imported article is re-exported from Bombay to Great Britain, The Strait Settlements, Aden, and especially to Hong-kong. The greater part of the horns imported by trans-frontier trade comes from Kashmir. There is no record in the trade returns of any exports to trans-frontier countries.

From the perusal of this article the readers will see ha there is a vast scope for extending this industry with the aid of modern machineries. It is a pity that this art has shown signs of decline owing to foreign, espically German competition. It is high time that these state of affairs must be checked.

The Art of Perfumery in India.—IV.

(Concluded from page 264.)

Pimpinella Anisum, *Linn.*—It is the true anise-seed. The fruit is distilled with water to obtain the fragrant oil of aniseed. The perfume is very powerful, and is well adapted for toilet soap and for scenting pomatums, but is not a favourite for making with handkerchief perfumes. *Arak badian* or water of anise is a favourite perfume in India.

Pinus longifolia, *Roxb.*—Is known in Oudh as *Dhup*, and employed for incense.

Pistacia vera, *Linn.*—The greenish, sweet flavoured and aromatic oil obtained from the kernels of the Pistachio nut is occasionally used as a perfume.

Pogostemon patchouli, *Pellet.*—The essential oil obtained from this plant is a very important perfume, known in India as *Pach ip it atar.*

Polyanthes Tuberosa, *Linn.*—This is the *Raj inigandha.* The otto is obtained from the flowers by the process of *enfleurage*, and is a highly prized perfume.

Prunus amygdalus, *Baillon.*—The almond yield by expression the oil of bitter almonds. It is now replaced by a chemical substance called nitrobenzene or oil of mirbane.

Psidium Guyava, *Linn.* The guava is used to make a perfume called *Puyara atar.*

Rosa *Linn.*—Rose plants comprise about 30 distinct species with very numerous cultivated sub-species and varieties. Nine species are wild in India. Otto of roses is perhaps the most favourite of all perfumes with the rich in India. For an account of collecting the otto, see an answer on Otto of Rose on page 127 of August 1913 issue.

Rosmarinus officinalis, *Linn.*—The flowers of Rosemary are distilled with water to procure the oil of rosemary, which is employed as an adjunct to many perfumes, e. g. Hungary water and Eau de Cologne. It is very often adulterated with rectified spirit of Turpentine.

Salix, *Linn.*—It contains about 150 species, 26 of which are found in India. The flowers of the Salix capera or the swallow yield by distillation with water an atar called *atar-bed-mush.*

Santalum album, *Linn.*—The wood and roots yied by distillation the essential oil of sandal wood, which is much used in per-

fumery. The white or sap wood is rejected.

Sassafras officinale, *Nees.*—The wood is distilled for obtaining the oil of sassafras, which is occasionally used in perfumery

Stereosperm m chelonoides, *D* C.—The highly scented flowers have not yet been utilized, but is used in Bombay as an offering to the gods.

Saussurea lappa, *Clarke*—It is the sacred costus root Is used in the preparation of perfumes and expensive forms of incense.

Styrax benzoin, *Dryand* - A volatile oil is distilled from gum benzoin, and the bal sam itself is also used as a perfume It is also used in making benzoated oil, which forms the base of many hair oils

Thymus Vulgaris —The leaves are distilled to procure the oil of Thyme which is used in many perfumes

Valeriana Wallichii, D C.—The root stalk are utilized in perfumery

Vanilla planifolia —The long podlike fragrant fruits are much utilized in perfu mery The active odouriferous principle vanilline is now imitated chemically in preparations from pine wood and oil of cloves

Viola odorata, *Linn* — The flowers of the sweet violet may be utilized in perfumery. The process of enfleurage will be suitable.

These constitute the vegetable raw material of India which can be or are utilized in perfumery.

ANIMAL

Among the animal products musk, civet and ambergris are the chief.

Ambergris —It is found in pieces floating in the sea near the coasts of India, Africa and Brazil. It is most probably a concretion formed, according to some authorities, only during disease, in the stomach or intestines of the spermaceti whale, *Physeter macrocephalus.*

Civet.—The pouch of the civet cat (Viverra zibetha, *Linn*) contains an unctuous odorous secretion, which is extracted and used in perfumery.

Musk —It is a secretion of the male musk deer only, the moschus moschiferus, *Linn.* It is a too well known substance. An article on the subject will appear shortly.

Butterflies —Our readers will be surprised to know that certain species of butterflies may yield many varieties of perfumes. Odour yielding scales, somewhat heart shaped with plume like tips are found on certain butterflies Giving an account of these, a couple of years ago, at the London Royal Institution, F. A Dixey, F. R S. stated that the scales appear only on the males and always on the upper surface of the wings A camel hair pencil brushed over this surface takes up the special scent. The odoriferous principle seems to be held in a cavity of the special scale. The odours are various, each species of butterfly has its own and the agreeable ones resemble the perfume of such substances as, sweet briar, orris, lemon, sweetpea, honeysuckle and jasmine Some are disagreeable · they smell like musty straw, stable litter, rabbit hutches acetylene, and bilge water. Surely the matter ought to be investigated by our scientists

MINERAL.

Earth atar —A perfume called *atar gil* is prepared by distillation from earth mixed with a little sandalwood oil. It is said to be used chiefly by Muhammadans, who consider that it exudes the odour of earth just after a shower of rain.

According to an article in the *Ind. Agriculturist*, before quoted, the prices of the most important perfumes at Jaunpore (one of the chief centres of the Indian perfumery

trade) were then as follows. It would be interesting to learn if any of our readers furnish us with current prices.

Perfume	Price per seer.
Rose atar	Rs. 40 to 50
„ water	As. 8.
Sandal wood oil	Rs. 28
Oil of chameli	Rs. 2 to 4
Oil of Jasmine	Rs. 2 to 4
Keora oil	Rs. 2
„ water	As. 8.
Oil of marigold	Rs. 40
Oil of Khas khas	Rs. 40
Oil of cajuput	Rs 30
Lemonpeel oil	Rs 20
Oil of clove	Rs. 20
Geranium oil	Rs. 10
Earth atar	Rs. 40
Attar of Henna	Rs. 50

Our readers will see that with improved processes, modern plants, extensive cultivation we can not only still hold our own ground but can supply the whole world with our perfumes. We shall try to give an estimate and illustrated article, of a modern flower distillery very shortly

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Lac Cultivation.

HOW SMALL QUANTITIES MAY BE UTILISED.

The latest Bulletin (No. 28) issued by the Agricultural Research Institute, Pusa, is a revised edition of a work by Mr C. S. Misra, B. A., First Assistant to the Imperial Entomologist, on "The Cultivation of Lac in the Plains of India." An appendix is added to the present edition in which Mr. Misra writes :—

Many enquiries have been made in the past about the use of small quantities of lac produced locally and which have no marketable value These may be utilised in preparing varnishes and polishes for home use. Two simple formulae are given below, but before being used for this purpose the material should be washed according to the instructions on page 20.

I —*Formula for making spirit varnish*

Methylated spirit	10 ozs. (25 tolas).
White resin (Pine)	1 oz 2½ tolas).
Seed-lac	1 oz (2½ tolas).
Dragon's Blood	1/8 oz (4 mashas).

[*Vernacular*. Kan Kharaba, Aprang, Hiradukhi (Hindi).]

II.—*Formula for making French Polish.*

Seed lac (ground fine)	3 ozs (7½ tolas).
Methylated spirit	20 „ (50 „).
Boiled linseed oil	a little.

The instructions on page 20, referred to above, are as follow :—

After scraping, the lac should be thoroughly dried in the shade and sold to the nearest shellac factory or the local agents of these factories. If there be no agent in the neighbourhood or there be insuperable difficulties in disposing of the produce, it should be ground with an ordinary hand-mill and soaked in water for 24 hours If the quantity is not large it can easily be rubbed with the hands in a stone vat or *Nand* (an earthen vessel with a wide mouth and a thick bottom) until the colouring matter—commercially known as the lac dye—is separated. More water is added and the stuff strained through a piece of cloth. The colouring matter is allowed to accumulate in a vessel and the stuff again put back into the vat and briskly rubbed. More water is then added and the washed material again strained. This is continued until no more colouring matter comes out. A little washing soda (Monohydrated Sodium Carbonate) is then lightly sprinkled over the washed product at the rate of 4

chhitaks (8 ozs) to a maund (40 seers of 80 lbs.) and the whole again rubbed briskly and more water added. By doing so the last trace of the colouring matter is taken out and the resultant washed material is of a beautiful pale orange colour—which is the seed-lac or *Dal* of commerce. If an excess of washing soda is added it takes away the wax adhering to the particles of the lac which when warmed becomes very brittle.

In factories, the washing is done in large stone vats placed in a row on a pucca or cemented platform. Ground and sifted sticklac is put into these vats and soaked in water for 18 to 24 hours The professional washers then stand upright in the vats and gyrate briskly, taking for their support bamboo poles fixed by their sides When the material is sufficiently washed the plugs at the bottom of the vats are opened and the washed stuff run out on to graduated sieves placed below the plugs. The colouring matter runs out and accumulates in a large tank especially built for the purpose. The half-washed resin is again put back into the vats and the washing continued until no more colouring matter comes out. The seed-lac is then dried in the sun and graded into granular seed-lac and dust—commercially known as *Gund*. The lac dye in the tank is then precipitated either with quick lime, lime-water or oxide of tin.

Wood Distillation.

India has been proverbially known to be a land of gold, but the gold that lay on the surface is evanescent. It is the latent capacity for unlimited production that enriches a country, and India in this respect is unsurpassed if only her sons know how to utilise her resources. Very few people properly realize how much wealth lies hidden in what we usually consider to be mere waste or things of little value. Indian agriculture is handicupped owing to lack of knowledge, means and enterprise on the part of the cultivating classes. Indian forest is still an unexplored region except for its timber, while mining is at present taken up only for foreign exploitation. Educated Indians must devote their energies to discover this hidden wealth and utilize it for the industrial advancement of their country.

I intend here to give a few details about one of such industries that has hitherto attracted very few workers but promises to open up unlimited possibilities if proper organized I refer to wood distillation, including manufacture on a commercial scale of all the products obtainable by dry distillation of wood and other similar vegetable substances. Wood charcoal acetic acid, line acetate, acetone, methyl alcohol, wood naphtha and tar are only some of the articles produced by wood distillation that are largely used in various industries and consequently have a considerable demand in the market. All these products are obtainable from common jungle wood that is either wasted away or at the most burnt for fuel A cart-load of such fuel can be had ordinarily in the jungle for 4 to 8 annas, and in many places it can be had merely for the cost of cutting and transport: and et the products when made marketable are worth hundreds and thousands of rupees. Nor is the apparatus very costly or the process of manufacture so difficult as to be beyond the capacity of ordinary workmen. With a little training and a small capital such as any man of average means can command, the industry can be started in the midst of a jungle. It is in fact essentially a forest

industry, and given the facilitie for transport, it can be most profitably carried on under the very trees of the forest.

Dry or destructive distillation does not require any elaborate or costly apparatus. A cast-iron or earthenware retort or still, with a metal condensing pipe and a wooden tub to act as a receptacle, all costing together not more than Rs 150, are quite sufficient to start manufacture: A brick furnace ought not to cost more than Rs. 50, and can be put up in any temporary shed constructed of non-combustible materials. Any kind of dry wood, vegetable shell, or bark is serviceable but timber useful for building purposes should be avoided as being too costly to be wasted for its charcoal. Soft wood is preferable while roots, trees, thick barks and such other hard wood are less valuable as they contain more tar and yield lesser proportion of acids and spirits. Wood containing a high proportion of tanning substances, such as acacia or tanning bark is also too valuable, and in fact every kind of wood which has some other use in commerce or industries should as a rule be avoided. The best kinds are those which are sufficiently hard and thick so as to yield good charcoal. Air-dried forest refuse or small splinters are preferable, as sun drying injures the sap and lessens the spirit yielding porperty. Given an abundant supply of good material and cheap fuel for the furnace, both of which are always available in or near any common forest, the manufacture can be started by any man with small capital and possessing ordinary training and scientific knowledge.

Charcoal manufacture is practised almost in every part of the conntry where there is considerable fores, and is likely to increase as there is in recent times a tendency towards the larger use of charcoal for domestic purposes, for small furnaces, in cities like Bombay and Calcutta. Charcoal being purer, is less bulky and gives less smoke and more heat for the same quantity. It is therefore mo e convenient for use, and is cheaper in the long run as compared with coal or wood. But the method of manufacturing charcoal is rather wasteful and does not yield as much outturn as we ought to get. The process hitherto in vogue in the Deccan and several other parts of the country is to dig a round trench of about 8 or 10 ft. diameter and about 4 ft. deep which is filled with dry pieces of wood up to the leve of the ground. An inlet is kept on one side just enough for a man to pass down fire the stack at the bottom and then close the aperture. When the whole stack is sufficiently heated, and the wood pieces are just charred but not actually burnt, mud and earth are profusely thrown over the trench to smother the heat, and then the charcoal is taken out. One ton of wood costing 1 to 2 rupees in the jungle will in this way yield 244 lbs. or about 9 Bombay maunds of charcoal worth 5 to 6 rupees. Taking into account labour, transport and trade profits, the mannfacture can hardly be said to be paying. The method besides has the great disadvantage of losing altogether wood spirits and tar which are given away in the form of gases and which in fact form the most valuable ingredients in Dry distillation if carried on according to improved scientific process gives the following results per one ton or 4 khandies of wood equal to 2,240 lbs. :—

	Rs.	a	p.
653 lbs. Charcoal of the best quality, at 10 annas per maund	15	0	0
210 lbs. Tar ½ anna per lb	6	0	0
560 lbs. Crude Acetic Acid at 5 S. per 100 lbs	21	0	0

317 lbs.	minor products, combustible gasses and loss which are not taken into account	
2,240 lbs.	Total Rs. 42	9 0

Cost of manufactme per one ton is approximately Rs. 11, while interest on capital required will not exceed one rupee per ton. Deducting this from the above income, we get Rs. 30 net profit per ton, which leaves sufficient margin for further processes of second distillation, purification, liming and other trade operations, so as to yield a good dividend on the capital invested.

The above results have been obtained by actual experiments, and the products also have been found to be highly satisfactory. The results of one such experiment by Mr. D. S Shaligram of Kolhapur were submitted to a leading firm of Chemists in Germany and were found to yield 8 per cent ... bly pure acetic acid which sells at 3 annas per lb. in the Bombay market. Acetic Acid when neutralized with lime or chalk forms lime acetate, which is largely used in dyeing and bleaching works. Pyroligneous acid is always in demand a a mordant and is largely imported in Bombay from foreign countiies If it can be manufactured and supplied locally, what an amount of saving can be made and how many people will find a profitable occuption and ready s urce of income? Every one of the products of distillation mentioned above is an article of trade. The charcoal by itself would be a paying concern. Then the acetic acid and their acetone compounds would be another source of income. The tar though often thro n away as waste would yield, if properly handled good many products which by themselves would form a separate industry. Among the minor products, we get methyl alcohol, wood naphtha and paraffin which also are of sufficient importance in the industrial world to form the bas s of separate manufactures. Of course the processes and apparatus used for the acquisition of these by-products vary considerably in elaborateness and cost but if properly managed they will amply re ay any labour spent on them.

Less ambitious men may in the beginning con ne themselves to the main products of charcoal, acetic compounds and tar. The following description of the process, taken from the *Bulletin* of the Institute will give a good idea :—

"In the destructive distillat on of wood the blocks or refuse are heated in a suitable vessel provided with a small aperture fitted with a pipe In modern practice the carbonising vessel is generally a cylindrical wrought iron retort built into brickwork in a horizontal position. The retorts are of an average size of 3 metres long by 1 met e in diameter and are made to hold anything upto about 4 ton of wood (a quarter or a 'cor "). They are generally set up in batteries of two, and heated by the same fire from below. The naked flame is not allowed to i pinge directly n the retorts which are heated only by the hot furnace gases, th s result being obtained by utilizing iron or brick shields or arches Before the application of heat ll the orifices and connection are plugged with clay. The batteries of retorts are set up in rows and the exit of each rotort is connected with a worm condenser made of copper and cooled externally by means of running water"

A cheap and serviceable apparatus would consist of a cast iron cylindrical retort of 18" inside diameter screwed with a cap

having an opening on the top connected with the condensing pipe. The condenser is of Liebig type and may be made of copper, brass or earthenware, straight pipe or coil insetted in a larger pipe or horizontal cylinder containing running water. The vapours when cooled are collected in a tub or receptacle, while the remaining gases are again carried to the furnace for combustion so as to economize fuel The liquid collected in the tub is then treated according to the kind of product we wish to get, while the retort is opened thrice a day and emptied of its contents of charcoal The condenser has to be cleaned frequently to prevent its being choked with accumulation of tar As all the substances are inflammable, great precaution must of course be taken to avoid the danger of fire, and the building therefore should be entirely of non combustible material

Another branch of wood distillation is the carbonisation of cocoanut shells which are so abundant in the palm growing parts of the Western coast of the Bombay Presidency, as well as in Bengal At present these shells are mostly burnt as fuel except a small quantity used for Hooka pots, buttons and such other small articles Cocoanut shells can be had for 10 or 12 annas a thousand, and give a very superior kind of charcoal largely used for water filters and by goldsmiths and other metal-workers for small furnaces. The oil is also sometimes extracted from the shell for medicinal purposes, but no other industrial use appears to have been thought of Dry distillation from cocoanut shell appears to give even better results than those from ordinary wood. Experiments made by a leading German Chemist with ordinary shells give the following results : —

One ton = 1000 Kg. = 2,240 lbs.

420 Kg. cocoanut coal with 3 to 3 5 per cent ashes.

44 Kg. Acetate of lime of 80 82 per cent.

6 Kg. Crude wood spirit calculated as product of 100 per cent

42 Kg. Cocoanut tar and Cocoanut tar oils to be used as fuel.

Acetate of lime 80 per cent obtained from Cocoanut shell when treated with Sulphuric Acid gives for every 100 Kg of Acetate 73 Kg. of crude acetic acid which when rectified will give 25 Kg of technical Acetic Acid of 90 to 99 per cent. Samples of crude acid and the residue of hard pitch obtained from shells by distillation in ordinary earthen pots were recently sent by me to Mr. F. H. Meyer, the well known chemist and manufacturer of distillery apparatus of Hanover-Hainholz, were analysed by him and were found to be 15·8 per cent Acetic Acid and 7·5 per cent pitch obtainable from 1000 lbs of shells. Distillation with a more scientific appartus would in addition have given good charcoal about (65 per cent) methyl alcohol and tar. These are very encouraging results and ought to convince everybody of the profits to be made by utilizing an article that is at present either thrown away or burnt as fuel A plant of the most improved type of 2 tons daily capacity would cost about Rs 15,000 and the whole outlay including engine, boiler and shed need not go beyond 20,000 rupees. It is wonderful that educated Indians and merchants dealing largely in cocoanuts and cocoanut oil have not yet thought of this very profitable industry.

The Charcoal industry has a great future before it. From air-dried wood, about one-third of its weight of charcoal can as a rule be obtained and it always fetches a higher price than the refuse itself. Charcoal is always utilized for many purposes and new discovered every day. Besides being [illegible]

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Industry

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"A new social force has come into being; new in magnitude, if not in kind. This force is the modern alliance between pure science and industry, and on that we must mainly rely for the improvement of the material conditions under which societies live. If, in the last 100 years, the whole material setting of civilized life had altered, we owed it neither to politicians nor to political institutions, but to the combined efforts of those who had advanced science and those who had applied it. If our outlook upon the universe had suffered modifications in detail, so great and so numerous that they amounted to a revolution, it was to men of science we owed it—not to theologions and philosophers. Science was the great instrument of social change, all the greater because its object was not change, but knowledge. Its silent appropriation of this dominant function amid the din of political and religious strife was the most vital of all the revolutions which had marked the development of modern civilisation."

—The Right Hon. Arthur J. Balfour. M. P.

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The Decline of Indian Art Industries.

The question of the decline of the Indian Art Industries has lately been ventilated by several of our prominent contemporaries with more interest than has been the case of years. It seems as if the nation would awake from the indifference it has so long been subject to on this question. We had for the last forty years many men in England and India, such as Sir George Birdwood, Sir Edward Buck, Sir George Watt, Dr. T. H. Hendly, Sir Swinton Jacob, Sir John Taylor, Mr. Kipling, Mr. Havell, Mr. Percy Brown, and Dr. Coomerswamy, who had not only recognised the beauties of Indian Art, but who had urged its revival, but very little has been done in the matter, so it at least appears, judging from appearances, that the once so famous Indian Art Industries are fast disappearing. We appeal to the nation to investigate the matter thoroughly and hope that ways and means will be devised that ought to be taken to revive the art industries of India And as at the present moment the Government is trying its best to do so by establishing Technical Institutions, etc., we should not remain blind to the fact that unless the art industries are revived, poverty and consequently ignorance, and *vice versa*, will hinder us from taking a place in the scale of nations of the present age.

We are of opinion that it is not too late to solve this question successfully, provided that the right ways and means can be found that ought to be followed up and that no other interests are taken into consideration, but that of the cause it is intended to benefit. If such ways and means can be found it will not only revive the Art Industries of India, but it will also provide means of earning a living for a very large number of artisans still in existence all over India, and thereby greatly lessen the number hankering after Government Service. This question is not only one concerning the revival of a once famous art industry of interest to the world, but it is also one of great social and political interest to the Indian Empire. The question is, no doubt, a very complicated one, and would require a most careful study to bring it to a successful issue.

Hindu society has undergone a great change under British suzerainty. It has adopted to a great extent Western habits in the mode of furnishing, which is adopted and imitated, in its crudest forms, which one can see in every Hindu household that adopted a Western style of furnishing, where

art is entirely absent. It is therefore of foremost importance that the education in schools should include that of the Fine and Industrial Arts, which undoubtedly would be one of the most powerful levers to the revival of the industrial arts. Innumerable questions require careful study, such as the question of Schools of Arts and the system by which they are conducted. It would also require a considerably large number of technical schools than now existing, making them generally available to artisans all over the country. Also to have travelling teachers visiting villages and smaller cities, teaching artisans in modern technics in their arts, also supply them with models. shapes and specimen articles after which their wares should be made in order to be of use for present requirements, and chiefly to assist artisans to find a sale for their wares by interesting private enterprise to find markets and finance the artisans.

The Government of India has this question for years under consideration and made such arrangements as it thought would revive the arts. Judging from results and what one sees, the measures taken were anything but the right ones. One Technological Institute on a grand scale in Calcutta will not do. Besides no provisions have been made for the training of the real artisans of the soil, except that of the weavers and teachers of mofussil technical schools. What we want is that the hereditary artisans should be given every facilities for improving their stock of knowledge along modern lines. Unless this is done there is no hope for the revival of true Indian Art Industries.

It must be generally observed by all that the art wares now exposed for sale by dealers are degenerating from year to year and more so during these last few years. This is, however, not due to expert artists being extint in India. On the contrary, expert artists still exist and work on a small scale, knowing not how to dispose of their wares. To that indefatigable worker, Mr. T. N. Mukherjee, is due the honour of bringing real works of Indian Art to the notice of the Europeans. It was to his skill, perseverance and ingenuity that the Indian works of art were put on for sale in the various railway book stalls of India. The reason that art industries are deteriorating is not due to the artists, but to the deteriorated taste of Hindu Society, the want of knowledge of a large number of tourists as to real Indian art and to a very great extent to the guidance of the Artisans by Anglo-Indians and Hindu dealers of the present day. Those members of the Hindu Society, i. e. 'the favoured few," that have the means to furnish artistically are devoid of any taste for harmony of colours, shape and form. They are only too apt to have copied the worst of European esigns, shapes and forms. Tourists have little time to select also, but a few have a knowledge of Indian shapes and forms, and they buy anything that appeals to them to be Indian, and in most cases by such as are cheap. The Anglo-Indian has generally not the means to pay what a well-made article costs. Their purchases consists mostly of what they have to send home as presents and calculating on the slight knowledge of real Indian art of the persons for whom they intend them, as well as suiting their means, mostly buy the cheapest. Consequently, the artisans make the class of wares that they know they can sell. In addition to the above, competition in trade is also an important factor that less and less artistic wares are from year to year made since the dea-

lers in art wares, for reasons of profits, order such from year to year to be made cheaper and also consequently more inferior.

It is to the caste system, the conservatism of Indian society, and their love for pomp and show that art industries in India have not by this time entirely disappeared. It is still the pride of every father and the tie of caste demands it that sons are taught the trade of the father, although they might, when they grow up take to other trades for want of work in their own. This and the conservatism of Hindu Society and love for pomp and show have maintained the art industry as it is up to date. It is in the Hindu household, temples, processions, religious and social, that indegenous art industrial articles, are in demand, thanks to Swadeshism, not tha it is understood or apreciated, but merely as custom demands; the popolar feeling that things must be as it was customary for centuries among their ancestors. It is, thanks to this, that artists are still in existence, and in large numbers, but there are still good numbers that is known to the uninitiated. But not only are there artists in large numbers, but there are still good ones who are artists in the real sense of the meaning. They can still make as good and artistic wares as ever was made if they only could find a market for their wares.

We, who are harping on the snbject for a long time, are of opinion that if the right means and ways can be found by which to assist the large number of artisans still in existence, that the revival of the art industries would be rapid one. Some deviation from the general rule in assisting industries in India by the Government would be necessary, and such deviation would be fully justified for reasons that private enterprise cannot be readily found to invest money in undertakings that do not promise an immediate return, and for reasons that the large number of artisans are quite helpless and they require advice in what to make and also require financial assistance as well as a medium to find markets for their wares. It is high time that the Industrial banks, Cooperative credit societies and such concerns should come forward to assist the artisans in pecuiniary matters and the leaders should try to establish Industrial museums and information bureaus all over the country for the disposal of art-industrial wares.

The industries of which a large number of artisans are still in existence and that have every chance of being revived with success are :—

Fancy silk, cotton and wool weaving, metal works, wood and stone carving, carpet weaving, and other art industries that were once famous in India of which now a less number of artisans are left, but that are of merit and for which every material is present in India, and which can be successfully revived with every chance of a financial success, and that would employ a large number of hands are embroidery, hosiery, enamelling on metal, lac and lacquered works, horn, bone and ivory industries, fibre, jute, sugar, and indigo industries, hand printing on cotton and silk, tanning, dyeing, and the fine art industries. The abovenamed art industries would appear to the uninitiated but a small number to be considered of a great national importance. This, however, is not so. The art industries we have named include an immense range of lines, providing almost everything of commodities that one wishes to have made artistically for personal use, dressing, furnish-

ing, architecture, and other requirements in life. If India has been called the "Epitome of the world,' why, surely then we must have in it what we require for our own lives. Her fauna and flora, her hidden and exposed mineral wealth, her jungles, her waters, her mountains and hills, her soil, everything upon which you live can give you anything if you try for it. Iron is under the earth, you shall yourself, not foreigners, have to dig it out and then shape it to your own requirements and so with everything you require. But there is hope still as we see from the various activities going on for the past few decades. It is not too late

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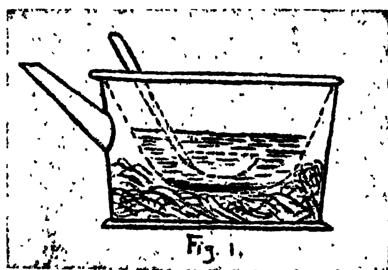
On the Etching of Glass Tumblers.

Glass etching is a very beautiful and prafitable handicraft. But very few artists, decorators and painters can execute really good work. The reason is that it requires a great deal of patience, skill and practice.

This handicraft may be briefly stated as the art of decorating glass by the use of acids, etc., and it requires very few materials and tools, which can be purchased at a trifling cost.

The materials required are: Pure bees wax, Japan wax, Russian tallow, Swedish pitch, Burgundy pitch, washing soda, soda ash, flouric acid, best commercial sulphuric acid, carbonate of ammonia, powdered French chalk or whiting, dragon's blood, vegetable black, and Brunswick black. These all can be had from any large chemist's shop, whose addresses have already appeared.

The tools and appliances required are: A steam dipping vat (Fig. 1), Ladle (Fig. 2) drainer (Fig. 3), pencil stick (Fig. 4), stiletto (Figs. 5 and 6), pouncing pin (Fig. 7), gutta percha bottle (Fig 8), and one or two gutta percha acid vats Figs. 9 and 10). A small tin or iron sancepan or two will also be needful; those unfit for cooking purposes may do provided they are free from cracks or holes.


Fig. 1.

The dipping vat can be made of stout tin, and a useful size for it will be the outer pan 12 in. diameter, 9 in. deep; the inner pan 12 in. across the top, 7 in. across the bottom, 6 in. deep. Any tinsmith would make such a vat for a paltry sum. The guttapercha bottle and the acid vats can be made of any size to suit the purse and convenience of the operator; the round vat may be made with sheet guttapercha 1/8 in. thick; large square vats should be made of ½ in. pitch pine boards with guttapercha as a lining. The drainer is used for dipping tumblers, finger cups, and other articles which cannot be touched while dipping. To use the drainer, hold it in the left hand, place the tumbler on its edge on the drainer, with the ladle pour over it the resist which has been melted in the steam vat, and, when completely covered, let it drain a little; then carefully slide it off on to the table and let it cool.

For the resist, with which the glass must be coated previous to actual working, any

three of the following mixtures may be used :—

(A)

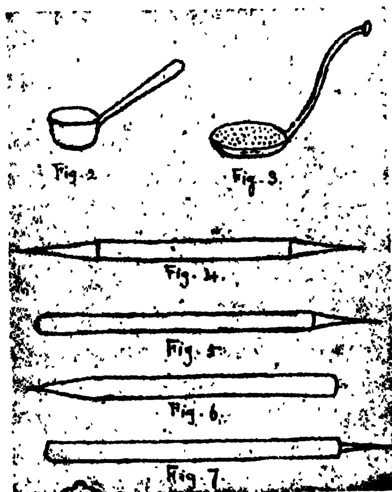
Pure beeswax	2 lbs.
Russian tallow	24 ozs.

(B)

Pure beeswax	4 ozs.
Japan wax	8 ozs.
Russian tallow	4 ozs.

(C)

Japan wax	2 lbs.
Burgundy pitch	16 ozs.
Pure beeswax	10 ozs.
Tallow	2 lbs.

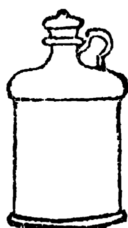


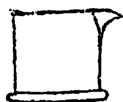
Melt the resist in the steam vat, wipe the glass quite clean and place it by the fire or in the oven to get hot evenly all over. It must be as hot as it is possible to handle without burning the fingers. Now, with the glass held by the stem in the left hand, in a standing position over the steam vat, and with the ladle in the right hand, gently pour over the bowl of the wine glass the hot melting resist inside first and outside afterwards in such a way as to completely cover the surface. Let it drain a little, and set it aside to cool; this is called dipping. Let the article get quite cold, then with a pad of fine cottonwool dipped into some powdered French chalk or well-sifted whiting, rub lightly over the coated surface of the glass. This dusting renders the work less trying to the eyes during the progress of drawing the design on the glass.

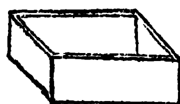
For drawing the designs the following tools and materials are required :—A lark's quill camel hair pencil, a cake of Indian ink, pencil sticks, stiletto, pouncing pin, a little dragon's blood, and some tissue paper. A rest for the arm will also be needed (Fig. 11.) The camel hair pencil is used for rough sketching on the dusted surface merely as a guide before using the pencil sticks or stilettos. The pouncing pin is used for perforating any design in the tissue paper. To make a pounce, fold a piece of tissue paper and let the crease be the centre line of the design it is wished to transfer to the glass. Now draw correctly half of the design the proper size on the folded tissue paper being careful to keep to the lines of the design. On opening the paper, the complete design will be found perforated. Cut this out, leaving a little margin all round the drawing. The pounce is used for transferring any number of the design, and when used there is no need for the rough sketching with Indian ink.

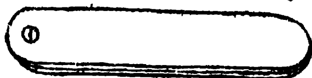
To use the pounce, place the tissue paper on the glass in a proper position and fix it lightly, but firmly, with two or three small pieces of soft-wax, which will adhere to the paper and leave the dusted glass without injury. Dip a small pad of cotton wool lightly into the dragon's blood, or if preferred, vegetable black, and rub lightly over the pounce, taking care not to miss any part ; the design

is by this means transferred to the glass, and forms a good guide in the actual drawing of the design on the resist coated glass. For this, pencil sticks and stilettos are required, according to the coarseness or fineness of the line desired. To make a pencil stick, split a piece of lancewood about 6 in. in length into strips ¼ in. square, and with a sharp knife cut nicely round and point them at each end. Scrape smooth with a piece of broken glass, and finish with fine glass-paper ; harden by well-drying.


Fig. 8


Fig 9


Fig 10


Fig 11

To make a stiletto, a piece of soft, close-grained wood (willow is the best) should be cut to shape. Get a coarse knitting needle. sharpen to a point, and drive it into the end so that it does not split the wood, leaving about 3/4 in. of the steel projecting ; sharpen this nicely, making the point round and smooth. Never try to work with a ragged point, as the result will be very bad. A bone stiletto can be made by filing off the hook from the end of an ordinary crochet hook ; this also will need to be nicely pointed, and will then make a line of medium thickness. The rest for the arm (Fig 11) can be made with a piece of 7 in. flooring board about 2 ft. 6 in. long ; this is attached to the work table by a stout screw acting as a pivot, so as to move it backwards or forwards as required. For a work-table an ordinary strong table will be about the right height. Sit in the most free and comfortable position possible while working, for if the operator is in any way stiff or cramped it will be found difficult to produce good work.

Having made these preliminary preparation, the operator may begin the work. Hold the leg of the edge of the glass, rest lightly but firmly against the edge of the table near enough to the rest to allow the right hand to be used with perfect freedom and at the same time to receive such a support from the rest as will insure the making of a beautiful firm line while drawing on the glass. Take the pencil stick or stiletto in the right hand, holding it as in drawing or writing ; let the arm lie on the rest and with the point trace through the resist the design already pounced on the glass. Be sure to bear the pencil stick upon the glass with sufficient weight to remove every trace of the resist and to leave a bright clean surface. If the lines are left greasy, a broken, rotten line, will be the result, as the acid only acts where there is no resist.

Having drawn the design on the glass, examine it carefully to see if there are any accidental scratches and if so, cover these with a resist made by melting together Russian tallow, 2 lbs.; Swedish pitch, 12 ozs.; and beeswax 4 ozs. Paint this also on the edge of the glass where the wax has been rubbed off by contact with the table. Cover also any part left blank when dipping, and allow to become cold.

A good etching acid may be made by mixing together fluoric acid, 12 ozs. ; water

12 ozs; sulphuric acid, 2 ozs. Firstly keep the guttapercha vat in a vessel of cold water. Then pour the requisite quantity of water in the guttapercha vat. Then pour the flouric acid, a little at a time, into the water. Allow to cool the mixture, and then add the sulphuric acid. When cold it is ready for use. The object of keeping the guttapercha vat in a vessel of cold water is to prevent its softening by the heat which is generated when mixing the acids, or while they are being poured in. Never pour unsteadily or handle the acids at random, and avoid splashing. Always wash the hands after using the acids or handling any open vessel containing them.

Now, to use the etching acid pour a sufficient quantity into another guttapercha vat and immerse the glass in it, weighting it to keep it down. After twenty or thirty minutes take it out carefully and wash with cold water to remove all traces of acid. To remove the resist, sponge with hot soda water; rinse in clean water, and wipe with a soft, clean cloth.

The effect will be a bright, silvery-looking design cut into the glass, and for many designs this is quite sufficient, but for others it is necessary to still further pursue the work by another process, which is called white aciding. The acid for this purpose is made by pouring 2 lbs. of fluoric acid into a gutta-percha vat and dropping into it, a small lamp at a time, carbonate of ammonia, until all the latter is dissolved and the effervescence has ceased; it is then ready for use. The amount of carbonate of ammonia required, can be ascertained by a few experiments on a small scale.

To prepare the article for white aciding, fill all the etched lines with Brunswick black by dipping the tip of the finger in the varnish and rubbing over the design in such a way as to fill the lines and leave as little on the surface of the glass as possible. Set aside for 10 or 15 minutes to dry, then rub quickly over the glass a piece of soft rag damped with turpentine to clean off the black varnish from the surface, and leave the lines perfectly black. Before the scum dries on the glass breathe on it and wipe over with another clean, soft rag. The glass will then be perfectly clean, and, by placing a piece of white paper inside the glass, the design will be seen in black. Paint carefully round the design and over the whole of the outside and inside of the glass, and when the varnish is dry immerse the glass in the white acid vat so as to completely cover the design. After thirty or forty seconds remove it and dip in clean cold water for a few seconds. Wipe off the deposit, clean off the varnish with terpentine, paraffin, or benzoline, and wash well in hot soda water; rinse in clear water, and finish by wipping on a soft cloth.

Another white acid may be made by mixing soda ash, 2lbs.; rain water, 1 gal.; flouric acid, 1lb. Dissolve the soda ash in the water, and add the flouric acid a little at a time; and when the effervescence has ceased let it settle, and it will be ready for use. To use this it is necessary to prepare the glass as for the white acid previously mentioned, but before putting the glass in the acid vat, sponge over the design with soap and soda water. Let it remain in the acid vat for thirty or forty minutes, and excellent results will be obtained. When removed from the acid, let the glass stand in clean water until the deposit on it can be sponged off easily. Clean off the varnish as before described.

Always keep the different acids in their own vats, or, if circumstances compel the use of a white acid vat for flouric acid or *vice*

versa, be sure to rinse the vat well with clean water before so using it. Always keep the acid bottles corked and the vats covered when not in use. Never waste the acids, but when, by use, they get weak and slow in their action, strengthen them by the addition of a small quantity of pure acids—for example, to 12lbs. of weak fluoric acid add 4 lbs. of pure fluoric acid and 1 lb of sulphuric acid. Keep the dipping wax clean by straining it through calico when necessary. Strong soda water, if applied *at once*, arrests the action of acid on clothing or on the flesh.

The Marvels of the Cotton-seed Industry.

That there is a vast scope for expanding this industry, cannot be doubted for a moment. It was a mere bye product in the last seventies but it has made the U. S. A. rich. We learn that in the U. S. A. in 1880 the value of crude cotton seed products, the oil, the cake and meal and the hulls, was only $7,690,921. In 1910 the annual output has increased to 167,970,000 gallons of oil, valued at $80,430,000; 1,7 2,000 tons of cake meal valued at $44,660,000 ; 1,375,000 tons of hulls valued at 11,170,000 and 39 ,576 bales of 500 lbs. each of linters, valued at $6,250,000, a total value of $142,7 0 000", and what that sum means can be easily understood. At present India raises about 1,300,000 to 1,800,000 tons of cotton seed annually, most of which is exported to Europe (98 p. c. to the United Kingdom) There seems to be no good reason why this seed cannot be used locally in the production of a substitute for ghee, the price of which has doubled within the last five years. Mr. Noel Paton, Director-General of Commercial Intelligence for the Government of India, states that he has gone into the question of a possible prejudice among the natives against the use of substitute and feels assured that no such prejudice will make itself felt. He has consulted several Brahmin priests respecting the matter, and learned that they would be entirely favourable to the use of such a substitute by the followers of this religion provided it contained no animal fat, and was made by machinery, and not touched by hands of people of other sects or low caste. He states that considerable Indian capital might be invested in undertakings to supply a cotton seed oil substitute if experts in cotton seed oil production were to establish such an industry here."

"Treated with 35 per cent. of its weight of butter, cotton stearine ought to be as good as ghee, not only in flavour and appearance, but in chemical composition. Cotton ghee should be cheaper than the very poorest grades of the ghee now on the Indian market which is usually adulterated with undesirable substances."

"In addition to several mills in the Bombay Presidency that press cotton seed oil, there are also two factories in North India, one at Lahore and one at Cawnpore, that extract oil from Cotton Seed. The factory at Cawnpore was set up in 1908 by the Government of the U. Prov. at a cost of 28,000 dols. an arrangement being made with a private firm whereby they were to carry on the work at their own expense for the time being, any deficit that might occur being made good by the Government. he firm was also to provide the requisite scientific supervision of the establishment, including laboratory experiments, etc., and to keep such records as the Government might require. In return for these services it receives

about 166 dols, per month from the Government. The oil is locally used for cooking, mixing with ghee and other oils, and to a small extent for Soap making. It is said that the chief difficulty with this industry lies in the disposal of the cake. A large quantity was distributed but it is thought that some years will pass before it meets with proper appreciation.

As the proper flavour for the cotton seed oil substitute for ghee will have to be imparted by turning and washing with milk and by blending with milk, cream, or butter, and as in some qualities the proportion of milk would have to be very considerable, Mr. Paton thinks it would be desirable in India that dairies should be attached to the industry. The dairy itself would afford an outlet for some of the cake and meal bye product, now apparently so difficult to dispose of. It would seem unquestionable that the use of this material for feeding the cows would greatly increase the yield of milk. Besides the diary there might also be, in the same enclosure, a soap factory to use up the residue of the refining process and a glycerine factory to work the lyes of soap manufacture. Cotton seed refineries could probably be most advantageously located near great provincial markets for ghee. The seed, however, might possibly have to be crushed in the cotton producing areas, where, as in the U. S. A., it could be combined with cotton ginning. The crude oil could be railed to the central refinery, along with some of the cake for use in the dairy."

The ramifications of the industry following the primary production may be indicated in the mere catalogue of subsequent products.

The linters, the small bits of fibre obtained in preparing the seed for crushing, go into batting, wadding, stuffing material for pads, cushions, comforts, horse collars and upholstery, into absorbent cotton, mixture for shoddy, mixture for wool in hat making, and in the manufacture of fleecelined under wear, into felt, low grade yarns, for lamp and candle wicks, twine, rope and carpets, and into collar for horse, for making artificial silk, writing paper and explosives.

The hulls becomes Stock feed, fertilizer, paper stock, household utensils and fibre for stuffing horse collars and for explosives.

The cake and meal become fertilizer and dyestuffs, feed for cattle, poultry, horses and swine, confectionery and flour for bread, cake and crackers

The oil becomes summer yellow oil, which is used in lard compounds and white cottonlene, as stearine goes into butter oil, cooking oil, salad oil, so called olive oil and oleomargarine, and it is also used in setting olives, in cosmetics, in packing sardines, as medicinal emulsion, as miner's lamp oil, and lubricating oil, in tempering edged tools, in mixing paints and putty, and in automobile tyres. Inferior grades of the oil go into soap, washing powder, glycerine, candles, olein, and roofing tar.

It will be understood from the above that the cotton seed, instead of being a bye product of the cotton plant, has become the main product, for it has become economically valuable upon more than so distinct lines, the mention of which suggests an immeasureable opportunity for expansion in volume. Surely the article ought to draw our most serious attention.

Musk & Musk Substitutes.

The term "Musk" is, in common usage, applied in compound names to a number of products of both animals and vegetables characterised by the peculiar scent of the true perfume. Amongst these the chief Indian musk-scented animal is the so-called muskrat, in reality a shrew, but its odourous secretion is not utilised. The flesh of the crocodile and the alligator smells of musk. The cerambyx moschata, a coleopterous insect, derives its specific name from the musky odour it emits.

Amongst vegetable musks may be mentioned the musk plant proper, Mimulus moschatus, common in window culture ; Ferula Sumbul, and Hibiscus Abelmoschus. The last mentioned is the only musk plant of commercial value. The seeds yield about 6½ p. c. of an odorous principle and resin. The former is a light green nonvolatile fluid having a strong odour, resembling that of a mixture of musk and amber hence the Arabic name habul-musk. Owing to their possessing this principle, the musk mallow seeds are used in perfumery, and are known to the trade in Europe as "*Grains d' ambrette.*" Dr. Piesse, in his *Art of Perfumery*, writes:—"Muskseed, when ground, certainl. reminds our smelling sense of the odour of musk, but it is poor stuff at best, and he recommends it only for making cheap sachet p wder. According to him the most valuable seeds are imported from Martinique. The Delphinium glaciale, a plant which grows on the Himalayas at the height of 17,000 ft., has a strong and disagreeable smell of musk. D. Brunonianum, which grows on the Western slopes of the Himalayas, has a similar smell of musk, though less disagreeable.

Musk has been built up artificially also. One part of oil of amber when stirred with a glass rod with four parts of nitrous acid, it is converted into a yellow rosin, possessing the smell of musk in perfection. It must be closely stopped up, like real musk ; but when used the nature of the acid must not be overlooked. There is another chemical the preparation of which will be unintelligible to the ordinary layman, known as Trinitrobutylxylene, which is sold as artificial musk, is much used in perfumery also. It sells at Rs. 8 to 12 per lb.

Despite the large number of products capable of affording more or less of a musk like odour, the musk deer remains the only important commercial source of the perfume. True musk is the dry, inspissated secretion of the preputial follicles of the male musk deer, *Moschus Moschiferus, Linn.* Musk deer is found in China, Tartary, Tibet, Tonquin and Siberia. Musk is secreted in a sac, about the size of a small orange, which is situated beneath the skin of the abdomen and its orfice lies immediately in front of the preputial aperture. When fresh, the secretion in the sac is in the state of a soft, salvelike, or of the consistence of "moist gingerbread," dark of reddish brown, or of a chocolate coloured, mass. By keeping, it dries, becomes blackish brown, and assumes the form of little rounded grains, which give a brown streak upon paper, and are easily rubbed to powder. When the animal is killed, the gland or pod is cut out and dried and in this form it reaches the markets of the Western world, chiefly through China. There are three principal varieties of musk in the world ; Chinese or Tongking musk, the best variety, is imported chiefly from Shanghai. It is usually

packed up in small tin-lined, silk covered caddies, each containing from 24 to 36 pods. Each sac weighs only about half an ounce, less than half of which consists of musk. They are generally adulterated with dried goat's or bullock's blood, fragments of leather, leaden pellets, etc. The Chinese pods sell at from 14 s. to 40 s. per ounce. The second variety is collected in the Western Himalayas and exported from India, to the extent of from 3,000 to 5,000 o/s. each year. It is much less prized than the Tongking musk. It is sub-divided into 3 varieties, of which we shall speak latter on. The third variety of musk is known as Kabardine or Siberian musk and is imported from Central Asia by way of Russia. This variety of musk resides in larger pods of a distinct species of deer and is far inferior to the other varieties in point of odour.

Genuine musk is dark purplish in colour, dry, smooth and unctuous to the touch. It possesses a peculiar, penetrating, long continued odour, and a bitter, astringent, aromatic, slightly saline taste. Boiling water dissolves half, alcohol one third, and ether and chloroform still lesser part of the substance. A single grain of musk will, without any appreciable loss of weight, scent millions of cubic feet of air, and this scent is not only more penetrating but far more persistent than that of any other known substance. Its chemistry has not been thoroughly investigated but besides its odourous principle, it contains ammonia, cholestrin, fatty matter, a peculiar oil, some salts, a bitter resinous substance, and other animal principles. The odourous principle is probably a product of decomposition, constantly being formed; complete drying destroys the odour, but it returns after water is added.

Musk has long been known and valued in Hindu medicine. In the *Bhavaprakasa*, three varieties are described, named *Kamrupa*, *Nepala* and *Kashmira*. The first is described as black and superior to the others, and probably consisted of China or Tibet musk imported *via* Kamrup. That of Nepal is described as of bluish black colour and intermediate quality, while the Kashmir musk was inferior. The drug was regarded by Sanskrit physicians as stimulant and asphrodisiac, and was employed in low fevers, chronic cough, general debility and impotence. (Dr. U C Dutt's Materia Medica of the Hindus, p. 279). In European medicine, musk is regarded as a powerful stimulant and antispasmdoic, and is chiefly prescribed in the advanced stages of typhus, typhoid, and other diseases of anasthenic type. It has also been found useful in spasmodic asthma, laryngismus stridulus whooping cough, epilepsy, chorea, diabetes, obstinate hiccough infantile convulsions, blood poisoning etc, in doses of 5 to 10 grains

Musk ranks as the first substance in the art of perfumery. Its powerful and lasting odour gives strength and permanence to the vegetable essences, hence it is a principal ingredient in nearly all the compound perfumes. Its odour is so owerful and penetrating that everything in its vicinity soon becoming affected by it and retaining the scent for a long time. It is no wonder therefore that rooms which were white washed, in which a small quantity of musk was dissolved some two centuries ago, still. retain the odour of musk. It has long been highly valued in perfumery, and though now little used alone, is very largely used in compound essences as stated above. Dr. Piesse writes: "It is a fashion of the present day for people to say 'that they do not like musk,' but, nevertheless, from great

experience in one of the largest manufacturing perfumatories in Europe, I am of opinion that the public taste for musk is as great as any perfumer desires. Those substances containing it always take the preference in ready sale so long as the vendor takes care to assure his customer "that there is no musk in it." The Italians dislike musk. Perfumers use the scent principally for imparting an odour to soap, sachet powder, and in mixing liquid perfumery. The alkaline reaction of soap is said to be favourable to the development of its odoriferous principle. Its fragrance is much affected and even completely destroyed by some other bodies, such as camphor, valerian, bitter almond and its syrup, powdered ergot, wax, lime, milk of sulphur, and sulphide of gold. But in all cases the smell is restored by moistening it with liquid ammonia.

PURITY.

The natural bags have rounded hairs but the artificial ones have not such rounded hairs. Mix some lime with the suspected specimen of musk, if it smells like ammonia, it is artificial. Wet a silk thread with the juice of the garlic. Draw this thread round a bit of suspected musk, if the bad smell of garlic remains, it is artificial.

PREPARATIONS.

Its preparations are so numerous that we are obliged to give here only a few of them.

AMBRETTE PERFUME.

Pound well together 6 oz. of starch, 2 oz. of yellow sanders wood, 2 ozs. of gum benzoin, 1½ oz. of storax, 1¼ oz. of calamus aromaticus, and a little quantity of labdanum, beat the whole into a fine powder and sift it through a sieve; then add 4 grs. each of musk and ambergris. Mix and bottle for use. A small quantity may be added at any time to powdered starch, to prepare a fragrant hair powder.

ESSENCE OF MUSK.

Musk in grains, 2 drams; alcohol, 1 pint. Used in compound essences. The odour of musk is very materially altered by the admixture of other bodies, particularly by the addition of sugar. It has then the odour of civet and ambergris.

MUSK HAIR POWDER.

Take 28 lbs. of starch and pound it with 2 drs. of pure musk.

MUSK MIXTURE.

Musk, powdered gum acacia, and sugar, of each 3 drams; triturate well together, then add gradually rosewater, one pint, still continuing the trituration. Used in low fevers, hysteria, nervous disorders, etc., in dose of 1 dram to one ounce according to the age of the patient and symptoms of the disease.

TINCTURE OR SPIRIT OF MUSK.

Musk, 2 drs., alcohol, one pint. Digest for a fortnight. Used as a perfume alone or for compound essences.

(2) Musk, 1 dr.; alcohol, half a pint. Digest and use as above.

(3) Guibourt directs one part of musk to 12 of alcohol. Others direct a much smaller quantity of musk. (4) A French work gives the following—Musk, 6 ozs.; civet, 1 oz., Tinct. muskseeds, 7 pints. Digest in the sun, or in a warm place for 2 months.

PERFUMED SACHET.

Orris root, ½ lb.; Rose leaves, ¼ lb. tonquin bean, in powder, 2 ozs; vanilla bean, in powder, 1 oz; musk, 1 dr.; any otto, 2 drops. Mix well and pass through a sieve.

CASSOLETTE & PRINTANNIER.

These are little ivory boxes, perforated to allow the escape of odours contained

therein, as a paste composed of equal parts of musk, ambergris, vanilla bean, otto-de-rose, and orris root with enough gum arabic or tragacanth powder to work the whole together into a paste.

MUSK WATER.

Dissolve 2 drs. of tincture of musk to a pint of distilled water.

MUSK SOAP.

White tallow soap, 5 kgm.: pure palm soap, 5 kgm Perfume with oil of bergamot, 50 grams : oil of roses, 5 grams : oil of cloves, 5 grams : oil of musk, 10 grams This oil of musk is prepared thus : Pound 10 grams of musk in a mortar, with an equal quantity of sugar and 5 grams of pure potash ; then add 160 grams of alcohol, gradually triturate for ¼ hour, pour the mixture into a flask, and leave from 2 to 4 weeks, shaking it from time to time. Then filter, add the whole of the filtrate to the 10 kgm. of soap, and afterward the other perfumes. Colour with 80 grams of brown ochre.

MUSK AND AMBERGRIS HAIR OIL.

Musk, 1 dr.: ambergris, 4 drs ; grind them together in a mortar, then with a small quantity of Til oil ; add more oil to make up two pints, and let them stand together for 24 days, stirring them occasionally. Then decant or filter. Add a pint of oil to the residue for an oil of second quality. Cheaper oil may be obtained by mixing a strong tincture of these substances with oil, agitating them frequently together, and after remaining some hours at rest, decanting the clear oil.

Syrups & Beverages.

During this hot season of the year, syrups, beverages, cordials, ice creams, etc. are in great demand. Last year we dealt about ice creams and in this issue we shall deal with syrups and beverages. These things have a large sale, because any one can see that every street of every large city have its own syrup vendor. Many persons are preparing them, but as they are unable to supply the demand, there is still enough opening for conducting the business

Syrups are solutions of sugar, more or less strong according to the object for which they are used. Employ only the best refined sugar, and either distilled or filtered rain water, as they will be rendered much less liable to spontaneous decomposition and become perfectly transparent without the trouble of clarifying.

When, however, impure sugar is used, clarification is always necessary. To do this, dissolve the sugar in the water or fruit juices cold and then beat up a little of the cold syrup with some white of egg and one or two ounces of cold water, until the mixture froths well. The mixture must be added to the syrup in the boiling pan and when the whole is frisked up to a good froth heat should be applied and the scum which forms removed from time to time with a clean skimmer. As soon as the syrup begins to simmer it must be removed from the fire and allowed to cool, when it should be reskimmed, if necessary, and then filtered through a clean flannel. By using refined sugar, however, all this trouble of clarification can be avoided.

When vegetable infusions or solutions enter into the compositions of syrups, they should be rendered perfectly transparent by

filtration or clarification before being added to the sugar.

Guibourt says that a perfect syrup should consist of 30 parts of sugar to 16 parts of water. For general purposes 2 lbs. (avor.) of sugar and one pint of water will do.

When preparing syrups, use as little heat as possible, for a solution of sugar, even when kept at temperature of boiling water, undergoes slow decomposition. The best method is to pour the cold water over the sugar and allow the two to stand together for a few hours in a covered vessel, occasionally stirring, and to apply a gentle heat, preferably that of steam or of a water bath, to finish the solution. Syrups are sufficiently boiled with some water, taken up in a spoon, pour out like oil, or a drop cooled on the thumb nail gives a proper thread when touched. When a thin skin appears on blowing the syrup, it is judged to be completely saturated.

A fluid ounce of saturated syrup weighs 577½ grains ; a gallon weighs 13½ pounds ; its sp. gr. is 1.319 to 1.321, or 35° B. ; its boiling point is 220°C., and its density at the temperature of 212 is 1.260 to 1.261, or 30° B. The syrups prepared with the juices of fruits mark about 2 or 3 degrees more on Baume scale than the other syrups. According to Dr. Ure, the decimal part of the number denoting the sp. gr. of a syrup multiplied by 26 gives very nearly the number of pounds of sugar it contains per gallon.

he preservation of syrups, as well as of all saccharine solutions, is best promoted by keeping them in a moderately cool, but not a very cool place. Let them be kept in well closed vessels and in a situation where the temperature never rises above 55F. Keep them in small bottles and not in large ones as is always done by those who have no scientific knowledge on the subject. For, the longer a bottle lasts the more frequently will it be opened and the syrup consequently exposed to the air. By bottling syrups while boiling hot, and immeidately corking down and tying the bottles over with a bladder, perfectly airtight, they may be preserved even at a summer heat for years without fermenting or losing their transparency.

The candying of syrups may be prevented (unless the syrup be over saturated with sugar) by the addition of acetic or citric acid, two or three drams per gallon. Confectioners add a little cream of tartar to the syrup to prevent granulation. Fermentation of syrups may be prevented by adding a little sulphite of potassa, lime, er salicylic acid. Some add a little absolute alcohol, say about 10 per cent. Fermenting syrups may be immediately restored by exposing the vessel containing them to the temperature of boiling water.

A solution of sugar prepared by dissolving 4 parts of double refined sugar in 2 of water, and boiling this a little, affords a syrup which neither ferments nor crystallizes.

The prevention of fermentation of fruit syrups is done by bottling while hot into suitable vessels and to prevent access of air. This may be done by various ways. For instance, fill the syrup while hot in quart bottles, previously warmed, and fill them almost full. Cork the bottles temporarily until the syrup cools a little and contracts in volume ; then, having heated a small quantity of the syrup, refil the bottles, cork them securely and wax them.

Varieties of syrups are made by adding proper flavouring ingredients to simple syrup, but in other cases, especially when

the juices of fruits are used, the syrup is not first prepared and then flavoured but the processes go hand in hand. In such cases special instructions will be given. One general recipe, which answers for nearly all fresh fruit, is as follows :—Use nothing but the very best fresh fruit, which must be freed from seeds stocks, and crushed with a wooden (not metallic) instrument. When well mashed, let it stand in a room of even temperature (about 68F) for 4 days, which will give sufficient time for fermentation to take place ; press out the juice from the fruit and let it settle in a cool cellar for 2 days, after which 5 lbs. of clear juice is to be simmered with 9 lbs. of loaf sugar. While warm strain through flannel. Some colouring matter may be added if necessary.

It is advisable to add to the fresh fruit, before setting it for fermentation, about 2 lbs. of powdered loaf sugar for every 100 pounds of fruit. When cold it is ready for bottling. Cleanliness should be strictly observed in all the utensils used. When bottling for storing, skim the top of any floating matter from the syrups in the boiling pan, and see that no residue at the bottom goes into the bottles. Most of the syrups not made of fruit may have a little mucilage of gum arabic added, in order to produce a rich forth. The following recipes comprise syrups made from the fruit and also from essences. These may be varied to suit taste and requirements. A variety of syrups has been brought into use by adding the various wines, such as claret, hock, sherry, etc., to simple syrup ; others by the addition of spirits, as milk punch, by adding to vanilla cream Jamaica rum and nutmeg. Almost any syrup may be made by the addition of a sufficient quantity of flavouring essence to simple syrup, but these artificially prepared syrups are inferior to those made from fresh fruits.

Any kind of colouring matter may be added to imitate the colours of fruits from which the syrups are made but red is the main colour. The most convenient red is probably tincture of cudbear, as it affords a good, substantial and natural looking colour, miscible with syrups without cloudiness. It may be made as follows : 2 to 4 ozs. powdered cudbear, 1 pint diluted alcohol. Exhaust by maceration or displacement. Used alone, the tincture gives a shade of red closely imitating the colour of raspberries or currants. For deeper red, like black berries, the addition of some caramel is all that is necessary. The strawberry colour is best imitated with tincture of cochineal. Aniline red, owing to its cheapness, is often used for colouring syrups, but it produces a glaring, artificial looking bluish red and is liable to objection that it sometimes contains arsenic.

SYRUP FORMULAS.

Apple syrup. Proceed with apples as for pineapple syrup.

Banana.—(1) oil of banana, 4 drams ; tartaric acid, 2 drams ; simple syrup, 12 pints. (2) Cut the fruit in slices and place them in a jar. Sprinkle with sugar and cover the jar, which is then enveloped in straw and placed in cold water and the latter is heated to the boiling point. The jar is then removed, allowed to cool and the juice is poured into bottles.

Cherry.—Essence of cherries, 8 ozs. ; citric acid, 7 ozs.; cane sugar, 12 lbs. ; distilled water, 20 pints ; liquid cochineal, sufficient. Dissolve the sugar in the water, and when cold, add the other ingredients.

Wild cherry.—Ground wild cherry, 4 lbs.; water, 2 gallons. Infuse for 48 hours, express and add sugar, 18 lbs

Chocolate.—Best chocolate, 10 ozs. ; water, 4 prints ; white sugar, 1 lbs. mix the chocolate with water and Stir thoroughly over a slow fire. Strain and add the sugar.

Cinnamon. Oil of Cinnamon, one dram : carbonate of magnesia, 2 drams ; water 4 pints ; granulated Sugar, 112 ozs. Rub the oil first with the magnesia, then with the waters gradually add, and filter through paper. In the filtrate dissolve the sugar without heat.

Coffee.—Roasted Coffee, 1lb ; boiling water 2 gallons. Enough is filtered to make one gallon of the infus on to which add Sugar. 14 lbs.

Currant.—Currant juice, 24 ozs, critric acid, 2 drams, Caramel, 1 dram ; tincture of Cochineal, 3 drams ; Syrup, enough to make 2 gallons. Mix.

Ginger. Tincture of Ginger, 4 ozs. ; Simple syrup, 8 pints. (2) Simple syrup, 12 pints ; water. 4 pints ; tartaric acid, 2 ozs; Ginger, 4 ozs Burnt Sugar to colour.

Grape—Brandy, 1 pint ; tincture of lemon, 20 ozs ; simple syrup, 2 gallons ; tincture red saunders, 2 quarts.

Hock and Claret.—Hock or claret wine, 2 pints ; simple syrup, 4 pints.

Imperial.—Equal parts of respberry and orrange Syrups.

Lemon.—Simple syrup, 12 pints ; distilled water. 4 pints ; essence of lemon, 4 ozs ; citric acid, 4 ozs., dissolved in boiling water. Mix and, if required, colour with saffron.

Malted milk.—Malted milk. 16 ozs ; hot water, 16 ozs, ; Simple syrup, 8 pints.

Mints,—Peppermint water, 4 pints ; Sugar, 6 lbs ; enough vegetable green colour

Orange.—Fresh oil of orange, 1 dram ; citric acid, 2 ozs ; water. 4 ozs ; Simple syrup, 2 gallons ; tincture of curcama a few drops. Rub the oil and acid crystals in a mortar until the latter have been reduced to a fine powder. add the water and when the acid has been dissolved, the Syrup

Orrange flower—Orange flower water, 1 pint ; granulated Sugar 28 ozs Dissolve without heat.

Pineapple.—Take a convenient number of the fruit ; pare and mash them in a marble or porcelain mortar with a small quantity of Sugar ; express the juice ; for each quart of juice take 1½ pint of water and 6 lbs. of Sugar, boil the Sugar and water and add the juice ; remove from the fire . skim and strain.

Raspberry.—Simple Syrup, 6 pints ; water, 2 pints ; tartaric acid, 2 ozs : essence raspberry, 2 ozs, colouring, sufficient.

Rose.—Syrup, 2 gallons ; essence rose, 2 ozs, Colour pink with prepared cochineal and acidulate lightly with a solution of citric acid

Strawberry—Take of fresh ripe strawberries, 10 quarts ; white sugar, 24 lbs ; water, ¼ gallon. Spread a portion of the sugar over the fruit in layers, let it stand 4 or 5 hours express the juice, strain, washing out the marc with water ; add remainder of Sugar and water, raised to the boiling point and strain

Wintergreen.—Oil of wintergreen, 50 drops Simple Syrup, 10 pints ; burnt Sugar, to colour, q. s.

We shall try to deal with medicinal syrups in a future issue.

Small Trades & Recipes.

SMELLING BOTTLE.

Alcohol	5 drams.
Ether	5 „
Chloroform	5 „
Menthol	1 dram
Liq. am fort	1 „

Mix ; pour a little on a handkerchief and let the patient inhale same.

FERTILIZERS FOR FLOWER PLANTS.

Potassium Nitrate	40 parts.
Calcium Carbonate	40 „
Sodium Chlorate	40 „
Calcium phosphate	40 „
Sodium Silicate	28 „
Ferrous Sulphate	2 „
Lithium Carbonate	2 „

Dissolve one gram of this mixture in one litre of water. Water the plants once with this every other day at dusk.

ARTIFICIAL HUMAN MILK.

White of egg	300 parts
Oil of sweet almonds	700 „
Sugar of milk	800 „
Sodium Carbonate	8 „
Neutral Calcium phos	50 „
Distilled water	70 „

Mix and make an emulsion in an emulsifier. This can be safely used when mother's milk is objectionable or a wet nurse is not available.

PIGEON'S FOOD.

Asafetida	2 drs.
Potas. Nitrate	8 „
Magnes Sulphate	2 ozs
Prepared chalk	2 „
Liquorice	4 „
Fine Sand	4 „
Corn meal	24 „

Mix. A little of this mixture may be given once daily besides the usual food.

AN ALLOY FOR BUTTONS.

Copper	20 parts
Zinc	12 „
Tin	40 „
Antimony	128 „

Melt according to their melting points and pour into suitable moulds.

DRAUGHTING PAPER

Water	30 parts
Powdered tragacanth	3 „

Dissolve, and strain through gauze. Stretch the paper on a board apply the mixture smoothly to it. The paper thus treated will take either oil or water colours.

BLACK TRANSFER PAPER.

Get some unglazed paper and rub it well with a paste made of gas black or black from a kerosene lamp and olive or linseed oil, with a piece of sponge and allow to dry.

ARTIFICIAL ESSENCE OF MELON,

Glycerine	6 parts
Aldehyde	4 „
Formiate of Ethyl	2 „
Butyrate „	8 „
Valerianate „	10 „
Sebacic ether	20 „
Absolute alcohol	200 „

Mix. This can used in making syrups, sherbets etc.

ORANGE SYRUP

Oil of orange	60 drops
Citric acid	1 oz
Simple Syrup	2 gallons

Rub the oil with the acid, mix the syrup and bottle.

Scientific & Industrial Topics.

An Aluminium Solder.

A new Aluminium solder, according to a recent French Patent, may be made by first making a fusible alloy (which will melt in boiling water) of 6 parts of tin, 16 parts of bismuth, and 10 parts of lead. The solder itself is then made by taking 20 parts of the fusible alloy, 600 parts of zinc, and 10 parts of aluminium. A softer solder is made with 320 parts of the fusible alloy, 160 parts of zinc, 50 parts of aluminium and 160 parts of tin.

A New Method of making Calcium.

In a new method of manufacturing metallic calcium, calcium carbide is heated, in an inert atmosphere under reduced pressure, or in a vacuum, to a temperature of about 1,500°C, the resulting calcium vapour being collected and condensed by suitable means. At present metallic calcium is produced directly in the electric furnace.

Raising Vegetable by Electricity

A series of experiments was carried out on a small English farm using an engine and a dynamo for obtaining the necessary current. The low tension current was transmitted to the field by wires, and there the current was converted into high tension. The current was then circulated over a barbed-wire arrangement above the plants. The general improvement effected in plant growth represented 29 per cent increase in wheat, 18 p. c in mangolds, and 25 p. c in strawberries. Similar satisfactory results were obtained in the treatment of cucumbers in green houses.

Electrolytic method of making Iodoform

Iodoform can be prepared now by the electrolysis of a solution containing 60 grams of potassium iodide, 20 grams of sodium carbonate, and 80 c. c. of alcohol per 400 c. c., the temperature being kept between 60° and 65° Iodine is liberated at the anode, so that the alcohol, pot carb., and iodine necessary to the formation of iodoform are all present in the mixture. By this method about 80 p. c of the pot. iodide is converted into iodoform, the remainder of the iodine being obtained as pot. iodate. The formation of iodate can be avoided to a great extent by surrounding with parchment the cathode, at which caustic potash is formed : this prevents contact of the pot. carb. with the iodine set free at the anode.

An Exhibition.

An international Cotton, Fibres, and other Tropical Agricultural products will be held in London from the 24th June to 9th July 1914, and substantial prizes will be given to those who exhibit the best varieties of cotton, by the British Cotton Growing Association. Our agriculturists ought to send in their products

The Java Exhibition.

Still another Exhibition is going to be held at Semarang, Java, very shortly. Visitors from India will find the exhibition with its attendant voyage, stimulating and entertaining. The Machinery Hall, The Sugar Palace, The Tobacco Pavilion, The Art Halls will all be of unique interest.

The number of those unable to read or write are about 70 per cent of the entire human race.

Industry Buyers' and Sellers' Guide.

M H P Ghatala, Banganapalle —Wants buyers of carpets, raw silk, silk waste, and a Kodak No. 3 Photo Camera.

Mr. H C Lahiri, Nilphamari.—Wants to buy various kinds of automatic soldering appliances.

S D Bhandari & Co., Hafizabad.—Wants to dispose of a copying press, 15 x 10, priced at Rs 35 Requests the Head Master of Jagraon to communicate with them for wooden shoes.

G C Patel, Shamala's Pole, Raypoor, Ahmedabad.—He can supply any kind of coloured threads regularly.

Mr. Mg. Ba Pe, The Sun Press Ltd, Rangoon.—Wants buyers of plantain flour. What is the current rate per ton?

Roll No. 3383, Ahmedabad.—Wants to dispose of a Durbar Auto knitter at Rs. 145; (2) a Brownie-Kodak quarter plate photo camera for Rs. 35; and (3) high class butter.

A Rajagopalam, 2723, 2nd Chatmi Road, Secunderabad.—Requests L. Diaz, Coonoor, to send the samples and quotations of Tea, Coffee, Eucalyptus Oil, Etc.

Mr B D O, Hoshiarpur.—For pill making machines please write to A. Dockrell & Son, 19, Ivanhoe Road, Camberwell and to J W Pindar & Co., Brockley Tips, both of London, S. E.

Thakurdas & Hotchand Bros., Sukkur, Sind.—They can supply lace, hand embroidery machines, hand cigarette making machine (price Rs 200), weaving machineries, and enamels.

The Fitrut Trading Co, Jafri Street, Fatehgarh, U. P.—They can supply all sorts of Japanese goods, pictorial post cards and postage stamps.

Mr. S B Banerjee, 30, Hari Ghose's Street, Calcutta —Wants to buy myrabolams, tamarind, castor oil, linseed, ginger, and rice. He also undertakes to sell other produce and oils in the local markets on strictly commission terms.

A R Khan, Fatehgarh.—Wants to buy Tuck's Post cards in large quantities.

The Andhra Knitting Factory, Guntur.—(1) They can supply Desi Cotton Socks at Rs 3 per Dozen, not less than 4 pairs, at a time, can be sent (2) They can supply Harrison "Nittol Ribber Knitting machines, 4½ inches diameter, with 132 cylin-needles and 66 ribber needles, complete with all accessories for Rs. 105. (3) They can take up agencies for the Andhra country (4) Wants to buy cotton mercirised cotton, silk and woolen yarns of all counts and shades.

The India, Europe, America Agency, Rajkote.—They can supply goods of every description of English, German, American or Japanese manufacture. (2) They also undertake sale of Indian produce in foreign markets, on commission basis. (3) They can supply Tryx and Ideal hand embroidery machines at Rs. 96 6 0 and Rs. 101-4-0 per 100 machines 50 machines in one parcel about 11lbs gross. Postage is about Rs. 5. Smallest order they shall accept will be of 50 machines at a time. Prices are subject to a discount, which vary from 35 to 50 per cent according to the quantity ordered at a time. Packing and freight, etc., will be extra.

P. A S. Kumar, Kottar —Wants buyers of Indian almonds

K N. Bhat, Karkul —Wants buyers of of sandal wood oil.

Radhey Lall, Bareilly —Wants to buy Indian vegetable tallow.

V. K. Soman Mehekar —For Mahwa oil, please write to Hope Bros, Cawnpore.

H. M. Ghose, Shibtola Street, Uttarpara. —Wants buyers of a specific for Asthma (2) Dr U. Ghose, 31, Tatarpur, Bhagalpur, can give you a medicine for hysteria (3) or you may try Ozerine, of I. D. Nicholl, 27 High St, Belfast.

B. P N, Coringa.—Wants to know the address of the manufacturer of Stephen's Ink of England.

M. G. Bhavnagar.—For the various foreign journals kindly write to Sell's Advt. Agency Ltd, 167, 168, Fleet St, London E C.

Mr. G N Mytu, Postal Tution School, Bari Dholepore.—Can supply all the back numbers of Industry, rubber stamp making and dry battery making outfits.

H.B P. Balarganj, Agra —Will you please give the address of Mr. Wense who exports animal blood, bones, hoofs, hairs, horns, etc.

Baldeo Prasad Sukla, Budhouli via Faridpur, Bareilly —Wants buyers of a sure cure for piles (2) Asks Mr H M. S. K, Sukkur, to write to him for samples of sugar and flour.

Champaka Rice Mills Co, Ltd, Mannargudi —Wants to dispose of bran and other bye product of the rice mill, Wants to know the names of journals on the rice trade only

Hazari Lall, C/o the Post Master, Rohtak. —Informs Mr Ramnarain, Tandianwala, to communicate with him about the Red Lamp Cigarettes' Agency in the Punjab

C. P. Bajpai, Gorakpur.—For information on fibre, please write to Mr. Jiban Krishna Sircar, P.O. Sukchar, Dist. 24 Prgns.

S: D. & Co. Trimulgherry —We shall be too glad to learn about the mistake of which you speak of. The addresses given, to the best of our knowledge, are right ones.

L. R. C., Dinanagar.—The head office of the Burmah Oil Co, Ltd, is at 173, West George St., Glasgow. Messrs Shaw, Wallace & Co., are the Calcutta Agents.

N. K. Bezbaruah, Barahapjan.—Wants buyers of tea Seeds. (2) Can any one go over to him for working a Durbar Autoknitter? What will be his terms?

"Hopeful".—The Pollachi Cycle Trading Co., Pollachi, S. India, can supply you the herbs required.

K A., Delhi.—The address you want has already appeared on page 115 of August 1913 issue.

Dr. G. K. P., Sholapur.—Wants to buy books on Dentistry.

I. V. R. G. R., Nuzvid.—For a suitable rock drill please write to Burn and Co, Howrah.

L. Harry Singh, Upper Shillong Farm, Shillong.—Wants to buy coffee in berries, Orchids, Bat guano, and lemongrass oil.

Reference Catalogue of Books.

[As many querists want the names of books on the same subject, we have thought fit to omit the names and addresses of the querists from this column.—Ed. I.]

Books on Manures

(1) Soils, manures, and crops. By R. S. Burn. Re. 1-14. (2) Manures and their uses. By A. B. Griffiths. Re. 1-14. (3) Treatise on manures. By the same. Rs 5 10 (4) Artificial manures. By A. Gibson. As 12. Those 4 book can be had from Messrs. D. B. Taraporevala Sons & Co., Medow Street, Fort, Bombay. (5) Fertilizers By E. B. Voorhees. Rs. 3-12. (6) Fertilizers and Feeding Stuffs. By B. Dyes, D. Sc. As. 14. (7) Agricultural Analysis. By F. W. Wiley. (8) Artificial manures. By M. G. Ville. 10s. 6d. net.

Books on Watch and Clock Making.

(1) Watch and Clock maker's Handbook By F. J. Britten, Rs. 4-6. (2) Clock Jobber's Handybook. By P. N. Hasluck. As. 12. (3) Watch Jobber's Handybook. By the same. As. 12 (4) Watch-maker's Handybook By Saunier, Tripplin, and Rigg, Rs. 6-12 (5) Clocks, Watches and Bells for Public Purposes. By Lord Grimthorpe, 5s 6d. (6) Modern Horology in Theory and Practice. By C Saunier, Etc, £2 2s (7) On the springing and adjustment of Watches By Britten, Rs. 2-10. (8) A Rudimentary Treatise on Clocks, Watches and Bells. By Lord Grimthorpe, Rs. 5-10 There is a journal exclusively on this subject It is the Horological Journal, published at 35, Northton Square, Clerkenwell, London, E. C, England.

Book on Rubber Stamp.

Rubber Hand Stamps. By T. O'Conor Sloane, priced at Rs. 3-12, and obtainable from Messrs. B. Taraporevala Sons & Co., Bombay

Books on Laundry.

(1) The art of Laundry Work. By F. B. Jack Re. 1 12. (2) Two hundred hints for the Laundry, As 14. (3) Dyeing and and Cleaning By Farrell, 1-5.

Books on Eri and other Silks.

(1) Kashmir: Its new Silk Industry. By Sir T. Wardle, Rs. 9-3 (2) Tasar Silk Industry in Bengal and Central Provinces of India. By N. G Mukherji, Rs 2-2 (3) Sir T. Wardle's Wild Silks of India. (4) Note on the Wild Silks of Malabar. R. Morgan. (5) Dr. Royle's Productive Resources of India.

Books on Fruit Preserving

(1) Fruit Recipes. By R. M. F. Berry, Rs 6-9 (2) The Art of Conserving By V. Galway, Rs. 2-3; (3) The Secrets of Canning By E F. Schwabb, Rs, 18-6. (4) Preserving Fruit, vegetable and meat, By E. Wagner, Rs. 4-6.

Books on Graphology.

(1) Psychology and Pathology of Handwriting. By M. Kinrzel—Thumm, Rs. 6-9. (2) Handwriting and Expression. J. H. Schooling, Rs. 2-4 (3) What Handwriting indicates. By J Rexford, Rs. 4-6

Books on Drinks and Beverages.

(1) Beverages. By J Alan Muray, B. Sc, As 14. (2) Drinks as they are mixed. By P E Lowe, Re 1. (3) Drinks of all kinds By F. & S. Davies, As 12. (4) Fancy Drinks and How to mix them. By Thos. Stuart, Re. 1.

Books on Beauty Culture or How to grow handsome.

(1) Criticism and Beauty By the Rt. Hon A. J. Balfour, M. P, Re. 1 12 (2) Beauty Culture. By H E Browning, Re 1-8 (3) Beauty's Aids. By the Countess E, Rs 2-2 (5) The Art of Being Beautiful By S G, As. 12. (5) Complexion Beautiful. By H Hara, As 14. (6) The Art of Beauty. By "Isobel," As. 12 (7) How to Grow Handsome By Mons D. H Jacques, Rs 3-8 (8) Health Beauty and Toilet By Dr A. Kingsford, Re 1-14 (9) Secrets of Beauty By Prof B. Laynard Rs 1-8 (10) Beauty aud Ugliness By V Lee and C. A Thomson, Rs 10 15 (11) Practical Face Treatment and Natural Beauty By a "London Specialist," Re 1-8. (12) Beauty Adorns By "Madge" As 12. (13) Fountain of Youth By Dr. G P. Muray, Rs 5-4 (14) Secrets of Beauty and Mysteries of Health By C. B Potter, Rs 3-12. (15) The Body Beautiful. By N. M. Pratt, Rs. 3-15 (16) Psychology of Beauty. By E. D. Puffer, Rs. 4-6. (17) Health and Beauty. By J. V. Shoemaker, Rs 12 (18) The Lady's Dressing Room. By Baroness Staffe, Re 1-8 (19) Attainment of Womanly Beauty of Form and Features. By Twenty Physicians and Specialists. Rs 4. (20) Beauty Culture. By W. A Woodbury, Rs. 5-4.

Reference Directory.

Gunny Bags.

(1) Alex. A. Apcar, 19, Radhabazar St. (2) D. Soloman & Co, 9, Grant's Lane (3) A M John & Co, 4, Mission Row. (4) King Brothers, 102, Clive St. (5) Permann & Hynd, 101|1, Clive St. (6) J. Thomas & Co, 8, Mission Row. All of Calcutta.

Opticians.

(1) Cooke & Kelvey, 20, Old Court House St (2) B K. Paul & Co, 7, Bonfield's Lane (3) Walter Bushnell, 11, Dalhousie Square (4) James Murray & Co, 12, Govt Place, East (5) Lawrence & Mayo, 16, Old Court House St (6) N Lazarus, 59, Bentick St (7) Dey. Mullick & Co, 2, Lall Bazar St All of Calcutta

Lubricating & Other Oils.

(1) Anglo-American Oil Agency Co., 2, Mission Row (2) Indo Burma Petroleum Co., Ltd, 19, Strand Road (3) Andrew Yule & Co, 7, Clive Row (4) Asiatic Petroleum Co, 9, Clive St (5) Don Watson & Co., 5, Commercial Bldgs (6) Br Burma Petroleum Co, 4, Mango Lane. (7) Burma Oil Co, Ltd, 4, Bankshall St (8) Barry & Co, 5, Lyon's Range (9) Gillanders, Arbuthnot & Co, 8, Clive St. (10) New York Standard oil Co, 8, Dalhousie Sq (11) Shaw Wallace & Co, 4, Bankshall St (12) Petroleum Products Co, Ltd., 8|2 Hastings St, All of Calcutta.

Exporters & Importers.

(1) Euegne Meiffer, 1|1, Pollock St. (2) F A. Ashman & Co, 19. Radhabazar St. (3) Ghose, Mitter & Co, Radhabazar St. (4) Henry Markwald & Co, 97, Clive St (5) Blackwood, Blackwood & Co, 12, Clive St. (6) B. H. Smith & Co., 37, Dhurmutola St. (7) Calcutta Export & Import Agency, 61, Clive St. (8) W Crowder & Co, Ltd, 1, Vansitart Row. (9) Thomas Cook & Sons, 9, Old Court House St (10) New York Export & Import Co., Clive St (11) Dinshaw & Co, 1 Hare St. (12) Mac Leod & Co., 31, Dalhousie Sq. (13) Schroder Schmidt & Co., 6, 7, Old Court House St. (14) Whiteaway Laidlaw & Co.,

Ltd, 4, 5, 6, 7, Chowringhee Road (15) Eroom & Co, 268, Dhurmmtola St. All of Calcutta

Patent Agencies.

(1) Calcutta General Agency, 1, Grant's Lane (2) Cantwell & Co, 24, Lindsay St. (3) Indian and Eastern Patent Agency, 6, Mango Lane (4) Sykes & Co, 1, Commercial Bldg (5) H V. William & Co., 14, Hare St All of Calcutta

Cardboard Box-making Machinery.

(1) Sa hsishe Cartonagen Machinen Act Ges Dresden, Germany (2) The Remus & Co. Ltd, 3, 32, Tabernacle Street, London, E C. (3) Thames Mills Purfleet, Essex, England.

Envelope Making Machinery,

(1) Hobbs Mfg Co, Worcester, Mass (2) John Lyod & Co, New York (3) F. L. Schmidt, New York (4) Ed Ernold 652, Hudson St All of U. S A (5) W John Bainbridge, 2, Fen Court, London, E C. (6) Envelograph Co, Ltd., 5 Tottenham St., London W. (7) Fischer Envelope Machine Co. 22 & 24 Scrutton St, Finsbury London E . All of England. (8) Gebr Tellschow, Berlin, 8036, Germany. (9) Alfred H. Schutte, Cologne-on-Rhine, Germany.

Glass Bottles.

(1) Cannington Shaw & Co., Ltd, Sherdley Glass Works, St Helens. (2) Nuttal & Co, Ltd, St Helens, Lanchashire. (3) Kilner Bros, Ltd, 18, G. N. Goods Station, King's Cross, London All of England.

Twine Making Machinery.

(1) New England Butt Co., Providence, R. I., U. S. A. (2) Watson Machine Co, Cleveland, Ohio, U. S. A (3) Hervest and Gamoh Co, Maimisburg, Ohio, U S A. (4) Larmuth Thomas & Co. Ld, Union Street, Cosslane, Salford, Manchester. (5) Ernest Lebmann, Manchester, England. This firm undertakes to give complete information regarding Fibre treatment and manipulation and will furnish estimates for complete installations

Water Finder.

W. Mansfield & Co, Creewood Engineering Works Brunswick Street, Liverpool, England

Formulas, Processes, Answers, Etc.

Vinegar.

Mr. D. D. H., Fazilka, writes: Will you kindly give a formula for making Vinegar?

We shall give a more detailed method of making all kinds of vinegars very shortly. But try the following recipe. Put in 20 gallons of rain water 2½ lb. of acetic acid, 1 gallon of molasses and one quart of yeast. Stir well, and allow to stand from 1 to 3 weeks. If stronger vinegar is desired, add more molasses.

Taral Alta.

Mr. D. K. D., Bangram, writes: I prepared Taral Alta from Carmine but it does colour well. Advise how to make it beautiful.

Rub up carmine with an equal weight of silicate of soda, and then add to this mixture a concentrated silicate of soda solution, till the whole is of sufficient or desired consistency. The product gives a very brilliant red colour when dry and dries quickly. It must be kept out of contact of air in a well stoppered bottle.

Blueblack Ink Powder

The same gentleman asks a formula for Blueblack Ink Powder.

Mix together water soluble nigrosine and methyl blue in equal parts in a motar. Use distilled water to make the ink fluidy.

A Good Liniment.

Mr. S. R. A. N., Chanda, sends us the following recipe.

Place two eggs in their entirety in half a pint of white wine vine ar. These will absolutely dissolve in twenty four hours. Add half a pint of turpentine and three penny worth of Ammonia.

This will make a powerful liniment,which must be shaken before using. The mixture will keep for years.

Odds and Ends.

Mr. S. R. A. N., handa, has kindly send us the following :

(1) Lemons may be kept almost indefinetely in the hot weather, without becoming dry, by putting them into a jar of water, with a lid on. Change the water once a week, if the lemons are to be kept longer. It will be found that they keep as firm as when fresh, and also much juicy.

(2) Fruit stains on table linen can generally be removed by stretching the piece across a basin and pouring boiling water in a thin stream from a kettle, directly on the spot. Wring it out, and pour more from the other side reversing the piece. (3) If a cover of oil cloth looks old and faded wash it over with skimmed milk. It will make a great difference.

How to mend China and Porcelain.

Mr. R. M. Pillai, Trichinopoly, writes : Will you kindly give a process for mending and joining China and Porcelain wares ?

An almost invisible joint may be made, with careful handling, with the following : Chloroform, 120 parts; India rubber, 50 parts; Mastic, 30 parts. Cut the rubber into shreds, put into a suitable glass stoppered phial, and pour on the chloroform. Stopper tightly and set aside until the rubber is dissolved ; then add the mastic, and let stand until the same is dissolved. Apply the cement to each surface to be united, and let the pieces stand until the reater part of the chloroform is evaporated ; then unite, press firmly to place and if possible, tie in position. When the cement is thoroughly dry on the surface scrape off the superfluity, and dust over the line of junction a little zinc oxide, chalk, or some such material, and with a clean pencil brush over the joint. After the cement has become perfectly dry remove the cords and rub off the superfluous powder. The joint can scarcely be discovered if the work has been carefully done.

How to make an Accumulator.

M. A. K., Agricultural College, Lyallpore, writes : I shall be extremely grateful to you, if you would kindly let me know as to how to make an accumulator.

Mr. A. J. Jarman, gave a very easy process for making an accumulator, in the *Scientific American*, which we quote here : "The following is a description of a thoroughly practical accumulator, which can be charged by a current either heavy or light, without injury to the positive or negative elements, there being no plates to buckle or girds to break. Procure as many stoneware jars as required for the number of cells to be made. Obtain some sheet lead 4 lb. to the square foot, cut this into pieces so as to

form a cylinder, allowing about 3|8 in. clear space between the inside of the jar and the outside of the cylinder, and punch the lead full of holes about 1|8 in. in diameter, using 25 holes to the sq. inch. If the lead can be purchased already perforated, so much the better. Bend the lead into a cylinder and rivet a strip of lead cut from the same metal (only not perforated) over the joint where the ends abut. Make this strip 3 in. longer than than the cylinder is high using leaden rivets made from a narrow strip cut from the same sheet. The strip that is rivetted may be 1 in. wide, and by covering the joint will make a good connection. Make up another cylinder of perforated lead to stand in the middle and rivet the conducting strip upon the inside of the cylinder. Allow a space of 3|8 in between this cylinder and the first one, fit into the bottom a piece of plain sheet lead and turn the lower part of the cylinder over to retain the bottom in place. Now melt some scrap lead in a laddle, get it red hot, and pour it from a height of about 5 ft. or 6 ft. into a pail of cold water. This will completely graunlate the lead. Make up enough to meet requirements, then pack this graunlated lead fairly tight in the space between the perforated cylinder and the jar. Also pack the inner cylinder full, place on the top of a piece of perforated lead and turn the top edge over to hold it firmly and retain the graunlated lead in place. Now cut some strips of wood the length of the space between the inner and outside cylinders, which should be 3|8 in. square, soak them in hot paraffin, and place them so as to effectually separate the inner and outer cylinders. If only, say, two cells have been made up, charge them with a mixture of sulphuric acid one part, and water ten parts, and couple the strip of inner cylinder of one cell to the outer connection of the other. Scrape the lead strip where contact is made binding this connection with a brass battery clamp. Now pass a current through the cells by connecting the terminals to direct current lamp circuit, or from a good constant battery. Allow the current to flow for an hour or two, then disconnect the charging wires, and test the cells for stored energy with an electro magnet or small motor, or the heating of a piece of fine iron wire. The effect will be astonishing. The voltage will be from 2 to 2.2 volt per cell, and the current may range from 1 to 10 amperes or more, according to the charge.

It does not matter how the cells are coupled in the first place may be made the positive or the reverse. It will not matter in the least, there being no buckling of plates to study and there may be a heavy rate of charge or discharge and the cells can be made of any size.

For a number of years the writer used a set of 56 cells made as described for work shop lighting. Sometimes an arc lamp was used, but generally 16 c p. incandescent lamps were employed. The stoneware jars in this case were fitted into square boxes filled in with coal tar pitch. For testing purposes a current as high as 200 amperes was taken from these cells at 90 volts. In fact, as a rough and ready storage cell, simple in construction and high in efficiency, it probably has no equal.

The capacity of the storage of energy can be increased considerably by reversing the charging several times after exhausting the cells previous to recharging. The finishing charge should leave the elements as to positive and negative the same as when first prepared.

Brief Queries and Answers.

A. V. N., Madapur.—Communicate your difficulties clearly and our Chemist will explain to you everything regarding hair oils.

K. D. S., Tonk.—We do not know whether there is any book on Tailoring in Hindi or Urdu but the names of books in the English language appeared on page 97 of July 1913 issue.

C. K. G. I., Kunnamkulam —Sorry that no one in India can supply you the books on Fire-works. So, please write to the Times Book Club, Oxford Street, London.

E. M. R. T., Bhandara.—For dealers in optical instruments please write to the firms mentioned on page 151 of September, 1913 issue.

The Eastern Bureau Ltd., Calcutta —Wants to know how rum is made from sugarcane juice ? (2) For a plant for generating electricity with its estimates, please write to Messrs Kilburn & Co, Calcutta.

V. Raja & Co, Madura.—Wants to know from what country the artificial rubies are imported ? (2) Have you consulted the addresses of Lithographers given on page 70 of June 1913 issue ?

Dr. M. M M., 'tinda.— Wants to know how syrup of vakas is prepared ?

M. H. P. Ghatalah, Banganapalle -For photo materials please write to the Nobin Pharmacy, Harrison Road, Calcutta.

M. C. D, Kamrup —There is no book on Indian perfumery, so the writer of the article will continue the subject in future issues.

Dr. P. M N. Haribavdi. -Please write to H. C/o Industry for the formulas

The City Emporium, Mysore.—We have written for the information regarding the machine for making sawdust briquettes and will let you know afterwards.

B. R. J. Bombay.—Sorry we can't give you the names of books on Idol and Idol worship.

Roll No 3720 —For replies to queries please write to the Editor.

P. L. S., Bhandara —Wants to know any method of dispelling wasps and bees for ever.

Mr. Jaya Krishna Rau, Christian Block, Basavangudi Bangalore.—Informs the Head Master of Jagraon that as he is a representative of an American University, he can give him information about an American University which confers degrees, by proxy, for courses taken in absentia. Enclose an anna postage stamp for reply.

Narayan M. M., c/o P G Chandavarkar B. A., L.L.B, Honavar.—Wants to know the address of foreign firms which deal in Indian fruits.

Roll No. 744, Rai Bareilly —There is no satisfactory method for preventing Cocoant oil from congealing But try glycerine, Alcohol, Castor or Til oil.

A. R.K., Fategarh —Please write to the Times Book Club, Oxford St., London, for second hand novels. (2) Wants addresses of picture dealers of England and Germany. (3) "Blick" and "American" Typewriters are the cheapest. You should better try to buy a rebuilt machine rather than a cheap one.

Contractor. Warbarton. -Wants to know the name and price of the book which contains instructions for burning bricks by Mr. Bull's Kilns.

Mr C. P. Bajpai, Gorakpur.—(1) For an oil mill please write to Messrs. Jessop and Co., Calcutta (2 Where can he get moulds for sealing wax and perfume cakes ? (3) who are the direct buyers of neem seeds and the exporter of the same ? (4) Is any reader acquainted with any gentleman of Lhasa ? 5) Wants to know the names of books on caligraphy. (6) Where Hindi nibs can be had cheap ? (7) Wants addresses of dealers in Swadhesi spectacles. 8) Where to get Swadhesi felt caps ? (9 Agricultural experts are requested to give their names and addresses. (10, Is there any expert who can find out riches hidden in the earth ?

The Kathiawar General Agency, Raikot, writes : The subscribers and readers of Industry, who have purchased Genz Wheeler & Co's Knitting machines, will find to their advantage to state with reasons and the full particulars enclosing a green stamp, if they do not get wages, to our firm, which will help as far as it can, in getting wages and otherwise. Also those, who work successfully and get wages, will oblige us and their fellow-purchasers by informing us with details the wages they get, etc., stating therewith whether they are willing to work on a fair remuneration.

V. K. Soman, Mehekar, Berar.—(1) Wants sellers of soapstock, neem oil and muhwa oil. Give quotations per cwt. (2) Consult an answer on books on soap manufacture on page 46 of May 913 issue. (3) Wants best methods for bleaching soap stock and for deodoring the same. (4) How to stop efflorescence on the cakes and blocks of soap ? 5) How to prevent rancidity of oils ? (6) The essential oils always contain a little alcohol and hence the burning sensation. Many ottos are naturally pungent also. (7) "Dilutol" of Mr. V. Ranade, of Girgaon, Bombay, may be used to dilute the scents. Its price; is 9as. per oz

Mr. P. S. R, Salem.—(1) Informs Clerk, Coimbatore, that he can get rolled gold or cased chains and rings from Sims and Mayer, Co, 52 Bedford St., Strand, London. (2) T. K. I., Kanla Sankata, is informed that fresh Sarsaparilla roots can be had of U. P Dutt & Co, Calicu Malabar. (3 I. N., Ahmedabad, is informed that Derby Sweep Tickets can be had of the Albert Victor Sporting Club, Ballygunj Calcutta. (4) R. Gondal is recommended to try the following process for frame guilding :—The wood is first coated with at least 2 layers of size and whiting. Several coats of gold size are then laid on after which gold leaves of suitable size are applied.

K. S. R. Petai.—(1) How to get rid of the bad smell of soaps ? (2) Kind y see a answer on Colour and perfumes for soaps on page 47 of May 1913 issue. (3) How to modify or discharge the dark colour of soaps ? (5) Can China Clay be mixed with soaps ? If so n what proportion ? (6) Various addresses have already appeared.

The manager, the American Trading Co., Cotton et—Informs S. R. P. Anekhal, that he can supply him a remedy for bed bugs (2) Kindly sent the literature on the subject.

S R A. Bangalore.—(1) Where to get Chiccori powder ? (2) What are popcorns and ginseng see s ? What are their Tamil equivalent and uses ?

C. P. T Sohagpur. -Wants to dispose of pieces of stones of various colours 2 Have you read the articles on Ink manufacture in Vol. II ?

S. C B.. Kauntia.—Wants to know the following :—(1) Is the ordinary Rangoon rice of Aus or of Aman class ? (2) Does it grow in low lands covered with water ? (3) What average depth of water will not destroy the crop ? 4) When is it harvested ? 5) Is the rice sunned or boiled ? 6, Is it true that lime dust is mixe with it for making it white ? (7) Can it be used in religious ceremonies ?

Mr. S. R. V. N, Chaudi.—Some recipes on dyeing will appear shortly.

Hari Chand, C-o The Indian Tobacco Co, Brunderth Road, Lahore. Wants the services of an Engineer who can take charge of an English made Henry William's Patent automatic cigerette machine ? Wants buyers of methylated spirits in bulk.

J. C. B. Suri —Kindly consult Thacker's Calcutta Directory for the names and addresses of the various foreign consul-generals.

Mr H. C. L., Nilphamare.—Wants to know the name and address of a firm who deals in the following automatic soldering machines, etc :—(1) Segment capping steel. 2) Tipping copper, (3) Pitting spoon. (4) Rounded capping steel. (5) Gasoline Fire pot. (6) Charcoal fire pot. (7) Soldering flux. (8) Tongs (9 Crates. (10) Cameras.

P K.C.,Benares —(1) Enquiries whether the climate of Benares be congenial for the growth of Eri Cocoons ? (2 Will any experts join in the above business ? (3) What will be his terms ? (4) Your other queries have been sent to a contributor for information.

B. L. Mehta, C-o Waghji Lakhmidas Khan Bazar Mandlvi, Bombay.—(1) Wants to know whether the various bonds offered by the Parsian bankers and brokers are genuine ? (2) He has got an agency in East Africa for a long time and wants to become an agent of any reliable firm of India.

Mr. R. N S., Bhagal.—The publisher may be written to for the book, whose address was printed in the note annexed by you.

To the Readers

With this number begins volume V of INDUSTRY. When, exactly twelve months ago we announced the improvements about to be made and the new features shortly to be embodied, we were considerably cheered by the whole hearted fashion in which hundreds of our readers took upon themselves the duties of publicity agents, and by their efforts succeeded in getting us many new readers. Partly as a result of that kindly interest, and partly, let us say, because during the past twelve months we have more than ever striven to meet our readers' needs by producing a bright, well illustrated, informative, and thoroughly practical paper, our circulation now stands much in advance of what it did at this time last year. For that we are grateful But what of this volume ?

The more readers we get the better the journal we can produce. Good as "Industry" is according to what our friends tell us we can make it still better, and we will do so if our efforts to help readers are reciprocated. We desire a wide publicity for this number of our new volume. Will old readers help us to get it ?

The Editor and his staff found that some deviation should be made in the arrangement of queries and hence this has been done which we think, would be for the better. With grateful thanks to all our readers, new and old we begin to work again, by the Grace of the Almighty.

Calcutta Market.

Calcutta, April 9.

EXCHANGE.

Bank T T	1-4 1 32	Firm.
Bank O D	1-4 1-16	
3 Months' D A	1-4 7-32	
6 " "	1-4 5-16	

Government Loans.

3 Per cent cash	...	82-8 to 83-8
3 1-2 do "	...	95-10 to 95-11
3 1-2 do month sight	...	95-9 to 95-10
3 1-2 do Bombay	...	95-11

Interest and Discount.

Bank of England from 29th Jan. 1914	3	%
Bank of Bombay from 15th Jan. 1914	6	"
Bank of Bengal from 19 Mar. 1914	6	"
Bank of Madras from 3rd Jan. 1914	7	"

BULLION MARKET.

GOLD— Rs.

English Bar—100 (touch) per tola ... 24-0-6

Australian Bar—(100 touch) ... 24-1-3

Sovereign—Victoria Shield, per piece 15-6-0

SILVER—

English Silver Bar of 17 1/4 dwt better per 100 tollah ... 80-0

PRODUCE MARKET.—April 8.

RICE.

Dwadkhani Rice	Rs 6-8 to 7-8	per md
Banktulshi	Rs 6-8 to 7-0	
Boiled Patna	Rs 5-4 to 5-8	
Ballam	Rs 5-9 to 5-14	
Kazla	Rs 4-6 to 4-11	

DAL

Moog Dal at Rs 6-8 (For Black kinds)

Yellow at Rs 9-0 to 9-8

Musur Dal at Rs 5-8 per md

Arhar Dal at Rs 4-13 to Rs 5-1 per md

SUGAR DESI

Cane.—Benares Rs 10-0 to 10-4

Goor: Rs 3-12

Date—Dobara Rs 9-12 to 10-0 per md

Goor at Rs 5 4 to 5-10

SUGAR IMPORTED.

Cossipur first white at Rs 7-12 per md

Small grain at Rs 7-6 per md

Crystal at Rs 7-9-0

Java F. M. at Rs 6-15 per md

GHEE Rs 51 0

Industry.

Is a monthly journal of art and handicrafts, Science and Commerce, agriculture and business. The rate of subscription is follows :—

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All business communications (Advertisements, changes of address, etc) should be addressed to the manager and no "query" letters should be intermingled with business letters. All remittances are made payable to him.

Industry is published at the end of every month.

Subscribers are enlisted at any time of the year but they will receive only the numbers from April to March comprising a complete volume for one year's subscription.

At the time of sending a V. P. P, only the current number is generally sent. The previous issues of the volume are sent, per book post on receipt of the value of the VPP.

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3, Mohon Lal Mitter Lane, Shambazar, Cal.

REWARD OF RS. 500.

The World Renowned

TALISMAN.

Sarvavijaya Kabach.

Mahajogeswari at Ravaneswara the greatest Goddess of Hindus.

We shall quote only one "Sloka" from the "Shastras" which declares in glowing terms the immeasurable, wonderful and magic effects of the Hindu "Talisman."

"Sarvagraha Prasamani Nishesha Bisanasini.
Jayam Sarbatra Kurute Dhanada Sumatiproda"

It destroys all dangers and difficulties, eradicates all sorts of poisons, and bestows victory at all times. It is a great giver of wealth and good graces.

THEREFORE

This Talisman is incomparable. It has no equal in the world. Its wonderful effects cannot be adequately described in words. Please use one and you will learn what it is.

By its use—(by use means simply wearing it round the neck, waist or arms) one will be free from all diseases and will be blessed with *success in everything* and in every act. *It increases* the beauty, lustre, glow and charmingness of the body hundred folds—both of men and women, boys and girls. It *bestows* perpetual youth endowing all with immense health and vigor. *It prevents* untimely death and early decrepitude. It is the greatest *charm* against all spirits, ghost, constellations etc. It is the *sole bestower* of all success and victory. A man is sure to get rich within the shortest possible, time whether he is engaged in service, commerce, trade, arts, etc., if he prefers to wear one of the wonderful Talismans. It is sure to make him happy and blessed by surrounding him with a merry group of children and beautiful and faithful wife.

It prevents all poisons whether due to infectious diseases, bad water and atmosphere or any other causes, from entering into the body. If any poison by some means or other enters into the body,—by its use, it will soon be driven out with excreta and urine. Therefore during all epidemics of plague, cholera or small-pox it is the **Protector**. In malarious places, if this great Talisman is used, one is sure to be free from any illness whatever. In short by the use of this wonderful *Kavacha* one will be always blessed with *sound and perfect health* and *long and happy life*. Therefore all men and women, boys and girls, both young and old, should not lose a day but use this great Talisman at once. As lightning conductor saves all buildings, churches, temples and big palaces from the thunder, so does this *Kavacha* save a man or woman from all evil effects, due to diseases or circumstances.

By its use one will surely meet with success in Horse Races," in *litigations* in *examinations* and in all other things. It will bestow *honourz from Government* and will secure handsome, beautiful and auspicious wife. By its use one will be able to be the *favourite of all.*

FOR WOMEN

This great Talisman is the *greatest blessing.* If it is worn with two small pieces of *Provala* (red coral, Pri e Re. 1 per pair) women are sure to be auspicious, wealthy, happy, sweet-voiced and sweet-tempered; in fact they will be the glory of all households making all happy, healthy and wealthy. By its use all women will blessed with handsome and healthy children, even if they are long sterile.

It is at the same time cheap. But it is not really very cheap if only one is to be prepared. It is to be brought from a place hundreds of miles away, its preparation and making cost much money but as we have

G. C. Sircar & Co.

Post Box, 391, *CALCUTTA.*

secured a very large number, we can afford to distribute them each at a nominal cost, namely :—

ONE RUPEE AND FOUR ANNAS ONLY.

(Packing and postage extra.)

It can be easily worn round the neck, arm, or waist, attached to a piece of thread. The thing is, it should always be carried with one self however that might be done, that is all.

Full Directions for use Accompany each Talisman.

Whole sale prices. 3 for Rs. 3-12, 6 for Rs. 6-12, 12 for Rs. 12-4, 25 for Rs 24, Postage and packing free in India and Ceylon. Abroad 12 annas extra.

Testimonials.

Mr. Kanai Lal Basu Mullick, 5, Duff Street, Calcutta, writes :—Your Talisman had a very healthy effect to get rid of galling effects of the Malaria I lost your Talisman when I thought I was quite well so that I was attacked with fever once more. I used many remedies but all failed. At last your Talisman was communicated to me by a friend and I used it and the miraculous effects came forth.

Mr. H. H. Pershad, Senior Evangelist and House Father, C M S, Champanagar, Bhagalpur, says —Your Talisman sent to me in February last did a great benefit so please send me another.

Babu Dharani Kanto Roy, 171, Raja bagan Road, Calcutta, writes .—I do not know to say about your Talisman It is a great panacea to all earthly diseases. I have your Talisman since the last 6 months and have fully appreciated its powers.

Babu Monmohon Das Gupta, Sadar Tahshilldar, Keoujhaigarh, Orissa writes — The Talisman you sent me last year has given me every success Please send another.

Mr. B. Cham Raj Bahadur, Commandant Imperial Service Lancers, Bangalore, writes :—The Talisman has given me satisfaction with its wonderful effects. Please send me half a dozen.

Mr. Raghu Beer Sarcar, B A, L L B, Vakil, High Court, Meerut City, writes :—I admit that in the year 1912 I have been keeping good health.

Mr. Sujjad Hussain, Judge, Bharatpura R M R, Eastern State, Rajputana writes :—I am glad to inform you of the wonderful effects of your Talisman. Send me 5 more.

Mr. N. A. Chidambaram Iyer, B. A., Sub-Registrar, Alur Bellary, writes :—I testify the efficacy of the Talisman. There are about 36 Talisman in use here on my recommendation amongst my friends and relatives who agree with me in saying, that the Talisman is a *divine gift*. It works wonders like a magician's rod. It has averted evil influences of planets in case of those that wore it I have much pleasure in recommending it as a *Rakshi*. It is worth its weight in gold I wish a world wide sale of this Talisman

Mrs. C. J. Sherwood, Mysore, writes :—Your wonderful Talisman has cured me of a standing sciatica pain from which I was long suffering.

Mr. A. S. Venkataramana Aingar Sub overseer P W D. K C. Canal upper subdivision, Kumol Post, writes : I have already got more than 20 Talisman for my friends and relatives they are all very effective. I am very glad to inform you that they worked wonders amongst my relative Send 4 more.

Mr W Bowen C/o Messrs. Walker & Co P O Box, 70, Madras, writes . -The Talisman you sent me some time ago has completely changed my life Indeed, I am so well pleased with the wonderful charm that I give you proof by sending for another.

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G. C. SIRCAR & CO. POST BOX 891. CALCUTTA.

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Industry

CONTENTS

Vol. V,
No 50
May

Royal Ed. Rs. 2-0 People's Ed. Re. 1-8 yearly.

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Srinagar, Kashmir.

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KASHMIR SAFFRON.—Short stemmed, finest and most Genuine quality, fresh from Kashmir Saffron fields, and far superior to the best imported Saffron of Spain etc. Per lb. Rs. 40 and Rs. 37-8.

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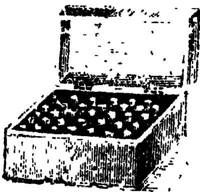
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HOMŒOPATHIC MEDICINES

Largest Stock Guaranteed Genuine and Just Received from Messrs Boeric and Tafel, America.

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OUR SPECIALITIES.—Medicines dispensed by able and experienced compounders. Dr. [illegible] K. Banerjee, Graduate, Calcutta, Medical College, attends here daily and treats medical patients by correspondence.

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SARSA VITO—enriches the blood, gives vigor to the system, improves digestion, removes aces and pains, produces refreshing sleep, dispels melancholy and nervousness, and builds up both flesh and strength. Re. 1 per phial. Postage extra. **G. K. Nag & Co.**

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REWARD OF RS. 500.

The World Renowned

TALISMAN.

Sarvavijaya Kabach.

Mahajogeswari at Ravaneswara the greatest Goddess of Hindus.

We shall quote only one "Sloka" from the "Shastras" which declares in glowing terms the immeasurable, wonderful and magic effects of the Hindu "Talisman"
'Sarva raha Prasamani Nishesha Bisanasini
Jayam Sarbatra Kurute Dhanada Sumatiproda"

It destroys all dangers and difficulties, eradicates all sorts of poisons, and bestows victory at all times. It is a great giver of wealth and good graces

THEREFORE

This Talisman is incomparable. It has no equal in the world. Its wonderful effects cannot be adequately described in words. Please use one and you will learn what it is

By its use—(by use means simply wearing it round the neck, waist or arms) one will be free from all diseases and will be blessed with *success in everything* and in every act. *It increases* the beauty, lustre, glow and charmingness of the body hundredfolds both of men and women, boys and girls. It *bestows* perpetual youth endowing all with immense health and vigor *It prevents* untimely death and early decrepitude. It is the greatest *charm* against all spirits, ghost, constellations etc. It is the *sole bestower* of all success and victory. A man is sure to get rich within the shortest possible time whether he is engaged in service, commerce, trade, arts, etc., if he prefers to wear one of the wonderful Talismans. It is sure to make him happy and blessed by surrounding him with a merry group of children and beautiful and faithful wife.

It prevents all poisons whether due to infectious diseases, bad water and atmosphere or any other causes, from entering into the body. If any poison by some means or other enters into the body - by its use, it will soon be driven out with excreta and urine. Therefore during all epidemics of plague, cholera or small-pox it is the **Protector**. In malarious places, if this great Talisman is used, one is sure to be free from any illness whatever In short by the use of this wonderful *Kavacha* one will be always blessed with *sound and perfect health* and *long and happy life* Therefore all men and women boys and girls, both young and old, should not lose a day but use this great Talisman at once. As lightning conductor saves all buildings, churches, temples and big palaces from the thunder, so does this *Kavacha* save a man or woman from all evil effects, due to diseases or circumstances.

By its use one will surely meet with success in Horse Races," in *litigations* in *examinations* and in all other things. It will bestow *honours from Government* and will secure handsome, beautiful and auspicious wife. By its use one will be able to be the *favourite of all.*

FOR WOMEN.

This great Talisman is the *greatest blessing*. If it is worn with two small pieces of *Provala* (red coral, Price Re. 1 per pair) women are sure to be auspicious, wealthy, happy, sweet voiced and sweet-tempered; in fact they will be the glory of all households making all happy, healthy and wealthy. By its use all women will blessed with handsome and healthy children, even if they are long sterile.

It is at the same time cheap. But it is not really very cheap if only one is to be prepared. It is to be brought from a place hundreds of miles away, its preparation and making cost much money but as we have

G. C. Sircar & Co.

Post Box, 391, *CALCUTTA*.

secured a very large number, we can afford to distribute them each at a nominal cost, namely :—

ONE RUPEE AND FOUR ANNAS ONLY.
(Packing and postage extra.)

It can be easily worn round the neck, arm, or waist, attached to a piece of thread. The thing is, it should always be carried with oneself however that might be done, that is all.

Full Directions for use Accompany each Talisman.

Whole sale prices. 3 for Rs. 3-12 ; 6 for Rs. 6-12 ; 12 for Rs. 12-4 ; 25 for Rs 24 ; Postage and packing free in India and Ceylon. Abroad 12 annas extra.

Testimonials.

Mr. Kanai Lal Basu Mullick, 5, Duff Street, Calcutta, writes: Your Talisman had a very healthy effect to get rid of galling effects of the Malaria. I lost your Talisman when I thought I was quite well so that I was attacked with fever once more. I used many remedies but all failed. At last your Talisman was communicated to me by a friend and I used it and the miraculous effects came forth

Mr. H. H. Pershad, Senior Evangelist and House Father, M S, Champanagar, Bhagalpur, says :- Your Talisman sent to me in February last did a great benefit so please send me another

Babu Dharani Kanto Roy, 171, Raja bagan Road, Calcutta, writes : I do not know to say about your Talisman. It is a great panacea to all earthly diseases. I have our Talisman since the last 6 months and have fully appreciated its power.

Babu Monmohon Das Gupta, Sadar Tahsildar, Keonjhargarh, Orissa writes : The Talisman you sent me last year has given me every success Please send another.

Mr B. Cham Raj Bahadur, Commandant Imperial Service Lancers, Bangalore writes :—The Talisman has given me satisfaction with its wonderful effects. Please send me half a dozen.

Mr. Raghu Beer Sarcar, B A, L L B, Vakil High Court, Meerut City, writes :- I admit that in the year 1912 I have been keeping good health.

Mr. Sujjad Hussain Judge, Bharatpura R M R, Eastern State, Rajputana writes : – I am glad to inform you of the wonderful effects of your Talisman. Send me 5 more.

Mr N A. Chidambaram Iyer, B. A., Sub-Registrar, Alur Bellary, writes :—I testify the efficacy of the Talisman. There are about 6 Talisman in use here on my recommendation amongst my friends and relatives who agree with me in saying, that the Talisman is a *divine gift.* It works wonders like a magician's rod. It has averted evil influences of planets in case of those that wore it I have much pleasure in recommending it as a *Raksh* . It is worth its weight in gold. I wish a world wide sale of this Talisman.

Mrs. C. J. Sherwood, Mysore, writes :— Your wonderful Talisman has cured me of a standing sciatica pain from which I was long suffering.

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The Decline of Indian Art Industries.—II

(*Concluded from page 4*)

FANCY WEAVING IN SILKS AND WOOL.

This is an industry that has been totally neglected, and is struggling hard against machine-made articles. A very large number of Silk and Shawl weavers are still in existence in various parts of India, in fact this is more or less carried on all over India, and the weavers that are still in existence are skilled in a manner that puts them on an equal footing with any of their European confreres. This Art Industry deteriorated not because there is no need for such hand-made fancy weavings which is not at all the case as the demand for such is greater now than it ever was, but because the Indian fancy weavers had not the support of the skilled middle man, who would have supplied them with the designs that is wanted for present requirements. In furnishing or still more so in ladies' dresses the demand for hand-woven articles is,very large which engages a large number of hand-looms in Europe. The better class of art weavings cannot be done by machinery, and especially in ladies' dress articles and the furnishing lines, since no one that can afford and with an artistic taste wishes to furnish and dress in a style that is made by machinery and turned out in millions of yards Hand-looms are therefore in greater demand from year to year, and there is an immense scope, not only for the revival of this Art Industry but for making it into a great financial success. India, as above said, has still a very large number of skilled brocade and shawl weavers who could produce the best styles in weaving for modern requirements. All they need is to be guided in what to make it. Therefore the middle man is indispensable especially so in dress articles in which fashions change rapidly, and unless constant contact is kept up with buyers of the world, no lasting success could be expected; but if this is taken up in the right way it could engage a very large number of artisans who to our knowledge can in every way compete with his European confrere, if not exceed him.

METAL WORKS,

This Art Industry covers a very wide range. It includes among others the following chief ones; Iron, Lead and Tin wares; Tinned, painted and Lac-coloured wares; Enamelled and niello wares; Gold

and Silver wares; Damascened and encrusted wares; and copper and Brasswares. "The antiquity and excellence of the Indian knowledge in Iron may be judged of from the famous Irom pillar at the Kutub near Delhi, from the numerous examples of wrought iron also hammered and perforated brass gates at the forts and Tombs of India, and from the superb collections of ancient arms to be found in the armouries of India." But the time has changed. The artists in India are still exceptionally clever in the preparation of chased, engraved and encrusted wares in gold, silver, brass, copper and pewter. If the artisans had had a little more assistance by private enterprise these art works ought not only not to have deteriorated but with modern technic that can be applied, it would have vastly improved. But as the artisans were left to themselves they continued to make their wares in objects such as arms which one wears, hookas which no one uses since cigarette holders are in fashion, lotas, which have been displaced by glasses, oil lamps which has been replaced by a superior electric light, gas or kerosine lamps, and so innumerable other now useless articles to the modern Hindu, and of no value as anything else to the European Collector but a curio. The encrusted wares which were made for decoration and embellishment of arms could be successfully applied to door and window furniture ;. silver, brass, copper wares could be wrought into innumerable objects of use that would be eagerly sought for not only by ourselves, but by the world's market. But few countries could compete with the Hindu Artisans in these lines.

ENAMELLING ON METAL.

This although not of very great importance, since it is not of large quantities, that ean be applied to, still the art is of great artistic merit and is farst dying out. It deserves to be revived.

WOOD AND STONE CARVING

We need not say much on this subject; its importance in architecture and furniture needs no explanation. Indian buildings and furniture ought to be embellished with carvings that would be the envy of the world as it was in ancient times.

EMBROIDERIES.

Hand embroidery gave livelihood to a large number of artisans in bygone days. The demand for this for furnisning and dressing have increased all over the world, and if the large number of Indian artisans receive the help necessary from private entesprise, a very considerable business can be done that would fully engage the large number of artists still in existence in this line, and thus the art will obtain the impetus to attain the old reputation for Indian art embroideries. Apart from the great number of professional embroiders, embroidering is done by a very large number of village women with whom this is, however, fast dying out, since they themselves have changed fashions and use cheap machine-made embroideries for their own use. The revival of this art with the village women would be a great help to a very large number of them, enabling them to earn a side income besides agriculture and so secure them against starvation in times of famine and scarcity.

HAND PRINTING ON SILK AND COTTON.

The demand for such articles is on the increase in Europe and America. since artistical furnishing does not permit machine printing. We have still a large number of skilled hand printers in India and in the last few years printing on cotton staff has

somewhat been revived, but much can be done in this line if it will be extended to printing on silks, for which a large demand has arisen. There is every chance with a careful guidance of the printers to develop this into an important article of export not taking into account local consumption at all at present which, however, is bound to follow as our society advances.

CARPET WEAVING.

The cause of the deterioration of this art industry is thus explained by Mr Mumford, in his most admirable work "*Oriental Rugs*": —"The apparent first cause was the desire of the Indian Government to furnish occupation for its prisoners in jail throughout the Empire and incidentally to neutralize the expense of maintaining the corrective system. Brought thus into competition with prison labour, the caste weaver was undersold, and had no resource save to cheapen his product and increase its volume."

But, if in our humble opinion, the prisoners, who were taught the art in jails, took to this industry after returning their homes, much good might have been excepted. Here is the old story again: the lack of help and private enterprise.

Though this industry engages a large number of hands, a large field remains, however, open for extension, and still more so for improvement of the Indian manufactures There is no other of the Indian art industries for which there is as great a demand and future in view as this one has.

That there is still no dearth of skilled carpet weavers can be gauged from the famous pearl carpet of Baroda. Sir George Birdwood thus describes it in his *Industrial Arts of India*:-The most wonderful piece of embroidery ever known was the *chaddar* or veil made by order of Kunde Rao, the late Gaekwar of Baroda, for the tomb of Mahommed at Medina. It was composed entirely of pearls and precions stones, disposed in an arabesque pattern, and is said to have cost a crore (ten millions) of rupees. Although the richest stones were worked into it, the effect was almost harmonious. When spread out in the sun it seemed suffused with a general iridescent pearly bloom, as grateful to the eyes as were the exquisite forms of its arabesques."

The industries described as above explained cover a very large range of lines, and artisans are in large numbers; besides this there are other industries which cannot be classed into art but that deserve attention, since a large number of workmen are in existence all over India that need guidance to turn their trade to a bread earning one. We shall mention only one which has a great future, this is wood turning on the lathe The large number of workers in India are gradually losing ground. If they are assisted this need not be so. With guidance they will find any number of articles new to them by which they could earn good wages. If one only looks at the large imports from Europe of buttons made in ivory, mother of pearl, horn and bone, also toys that are all turned on hand power lathes, one can at once form an idea of the importance of the turners industry.

As above explained we are of opinion that the art industries would be rapid if the right means and ways can be found. It is the Hindu leaders of society that cou'd do most without the co-operation of the public and private enterprise. The Government of India can never solve for the country so important a question. We have no doubt the Government would greatly appreciate public co-operation in this matter.

Snuff.

Snuff taking has become such a common practice that the late Lord Stanhope pointed out a very peculiar conicidence to the effect that "a man loses exactly 36.5 days out of 365 by Snuff taking." This commodity has a lerge sale, but unfortunately really good Snuff is rare in the market. If we can successfully prepare the substance we can still check the importation from foreign countries to a large extent.

It is a powder, prepared from tobacco, for the purpose of being sniffed up the nose as a stimulant or intoxicant.

The finer kinds of Snuff are made from the soft portions of the best description of manufactured leaf-tobacco, separated from the damaged portion; but the ordinary Snuffs of the shops are mostly prepared from the coarser and damaged portions, the mid-ribs, stems, stalky parts, that remain from the manufacture of ' shag tobacco," the dust or powder sifted from the bales, and the fragments that are unfit for other purposes. In Bengal the following varieties are used for Snuff making: *Hinghli*, *Motihari*, *Shibajata*, and *Lanka*.

PREPARATION.

The proper materials being chosen, and if not in a sufficiently matured state it is rendered so by further fermentation. They are sufficiently dried by a gentle heat or exposure to the air to admit of being pulverized. The fermentation above alluded to, is performed by spinkling brine over heaps of tobacco-leaves and allowed to stand for few weeks or months. The pulverization is performed, on the large scale, in a mill, and on the small scale, in the mortar. During the operation the tobacco is frequently sifted, that it may not be reduced to too fine a powder, and is several times slightly moistened with rose or orange-flower water or eau d'ange which are the only liquids fit for the superior kinds of Snuff. Inpreparing the dry Snuffs no moisture is used. The scent or other like matters are next added, and after thorough admixture, the Snuff is packed in jars or canisters. In India a certain quantity of lime or lime water is mixed with the tobacco, during the preparation for giving the Snuff a pungent quality and some say, to check the narcotic action of the pure leaf.

ADULTERATION.

During the grinding of tobacco it is frequently mixed with dark coloured rotten wood, various leaves, colouring and other matter. Ammoni , hellebore, euphorbium, and powdered glass are common additions to Snuffs to increase their pungency. The moist kind of snuff are generally drugged with pearlash, for the triple purpose of keeping them damp and increasing their pungency and odour. The dry snuffs, especially 'Scotch' and 'Welsh,' are commonly adulterated with quicklime. This addition causes their biting and desiccating effect on the pituitary membrane. Besides these, several other things are added to snuffs such as, Salammoniac, Redlead, Umber, Chromate of potash, chromate of lead, carbonate of ammonia, orrisroot, and sand.

VARIETIES.

Snuffs are divided into two kinds—Dry Snuffs as Scotch, Irish, Welsh, and Spanish Snuff, Luudy foot, etc.; and Moist Snuffs, or Rappees, including 'black and brown rappee, Carotte,' 'Cuba,' 'Hardham's mixture,' prince's mixture, 'princeza, queens Snuff, etc. The last three also come under the domination of scented snuffs.

The immense variety of snuffs kept at the shops, independently of the above named ones, depend for their distinguishing characteristics on the length of the fermentation, the fineness of the powder, the height to which they are dried. and the addition of odourous substances. Tonquin, ambergris, musk, civet, leaves of Orchis feusea, root and oil of calamus aromaticus, powder and essences of orrisroot, and the essences or oils of bergamot, cedrat, cloves, lavender, petit grain, neroli and roses as well as several others, either alone or compounded, are thus employed. Tabac Parfume Aux fleurs is perfumed by putting orange flowers, jasmins, tuberoses, musk or common roses, bel, champak and bakul flowers, to the snuff in close paperlined leaden box or stoneware jar, sifting them out after 24 hours and repeating the treatment with fresh flowers, as necessary and storing the finished product in leaden boxes. Another way is to lay paper, pricked all over with a large pin, between the flowers and the snuff.

Roman Snuff was snuff moistened with white wine and essences of musk and ambergris. Maltese snuff was snuff mixed with powdered rose-roots or liquorice and white wine or brandy and any kind of essence. Spanish snuff.—Pound in small mortar 20 grs. of musk with a little sugar. Add by degrees 10 grs. of civet and then rub all together between your hands.

Seville Snuff is only Spanish Snuff with the admixture of 20 grs. of vanilla.

Macouba Snuff is imitated by moistening the tobacco with a mixture of treacle and water, and allowing it to ferment well.

Yellow snuff is prepared from ordinary pale snuff moistened with a mixture of yellow ochre diffused in water, to which a few spoonfuls of thin mucilage has been added; when dry, the colour that does not adhere to the snuff is separated with a fine sieve.

Red Snuff.—As last, but using red ochre.

Besides the above there are many medicinal snuffs which we leave out for obvious reasons.

The following are the perfumes mostly used by modern snuff manufacturers. (1) Essence of bergamot, 2 oz.; ottos of rose and neroli, of each 1 dr.

(2) Oil of lavender, 1 oz.; essence of lemon, 2 oz.; essence of bergamot, 4 oz.

(3) To the last, add oil of cloves, 2 ozs.

(4) Essence of musk and ambergris, of each, 1 oz.; liquor ammonia, 1½ dr.

Simple essence of bakul, champa, rajanigandha, bel, aguru, white rose, and the artificial perfumes of banana, pineapple, and of others are used also.

Ambergris.

Abr amber, *Aanb ır*, *anber*, *or araba* of the Indian Bazars, is produced from ambergris. Ambergris is found in pieces floating on the sea near the Moluccas, in other parts of the Indian Ocean and off the coasts of Africa and Brazil; when fresh, it is solid and of an ash-grey colour, spotted like marble with black spots; but it appears to vary considerably in colour, some pieces being white, some black, and some grey with yellow spots. It is very light and easily takes fire. It is most probably a concretion formed in the stomach or intestımes of the sperm(—aceti) whale. *Physeter Macrocephalus* Several specimens have been found full of the embeded beaks of a species of sepia which is the food of the *physeter*: it is supposed by some to be formed only during

disease, as the specimens of the whales in the stomach of which ambergris was found were sickly.

Dried cowdung smells of ambergris and that even nightsoil, under certain kinds of treatment, assumes a powerful odour of ambergris.

Ambergris is chiefly brought from Singapore. It is used as an aphrodisiac and is next in importance to musk in perfumery. It was formerly used in cookery. It sells at Rs. 18 to Rs. 22 per dram.

ITS CHEMISTRY.

Ambergris has a peculiar aromatic, strong agreeable odour like musk, fatty taste, is almost completely volatilizable by heat, and is inflammable. It is insoluble in water, but is readily dissolved, with the aid of heat, by alcohol, ether, and the volatile and fixed oils. 'It consists, to the amount of 6ths of its weight (nearly 85 per cent), of a peculiar fatty crystalline substance, soluble in alcohol analogous to cholesterin of bile and brain, and denominated by Pelletier and Caventou, *ambrein*. This may be obtained by treating ambergris with heated alcohol; filtering the solution and allowing it to stand, when crystals of *ambrein* are deposited. It is incapable of forming soaps with alkalies. When pure it has little or no odour.

ITS PURITY.

The best variety is grey, easy to break, and light in weight; the worst is dark coloured, tough, heavy,and with little odour. The better kind melts readily, and is frequently adulterated with wax, storax, and lab danum. To detect this it is usual to thurst into the mass, in several places, a hot needle Those acquainted with the real article detecting the adulteration by odour; wax also takes away its brittleness. Some times sand is added, a powerful magnifying glass will render this apparent. It ought to float on water and dissolve totally in hot alcohol.

ARTIFICIAL AMBERGRIS.

It is also partly soluble in alcohol. The materials must be rubbed together in a mortar till of a uniform mass. Spermaceti, 8 oz; grain musk, 1 oz; gum benzoin, 20 oz; ben nuts, 6 ozs; orris powder 20 ozs; liquid, ammonia, 2 ozs; yellow resin, 3 ozs; white wax, 3 ozs.; Genuine ambergris to the amount of 8 ozs; to the above quantity is sometimes added making evidently a nearer approach to the real article.

TINCTURE OF CIVET.

It is formed by macerating an ounce of of civet with half an ounce of ambergris in two quarts of alcohol. If it is added, in in minute quantities to lavender water, tooth powder, hair powder, toilet soaps, they will be scented with the odour of ambergris.

ESSENCE OF AMBERGRIS.

Mix one ounce of ambergis, half an ounce of musk and 2 quarts of spirit of ambrette; put them into a large bottle; and let them digest for a month or two, being exposed to a very gentle warmth, such as that of a warm room or the heat of the sun Or digest in half a pint of alcohol or brandy one dram of ambergris and 8 grains of musk.

AMBERGRIS PERFUME.

It will improve by age. It is a sort of stock material for making ambergris hair powder. For 3 or 4 days after making, it may with advantage, be exposed to the air, so that the alcohol may evaporote. Take 2 dwts. of fine ambergris, melt it gently over the fire; now stir in very quickly a mixture

ready prepared of 4 oz. of loaf sugar, and well incorporated with 12 grains of musk, 12 grains of civet, 12 grains of gum benzoin, and 2 or 3 drops of oil of lemon. When this is well mixed with the melted ambergris and one ounce of alcohol, add 15 lbs. of the best starch powder, passing the whole 2 or 3 times through the finest hair sieve.

AMBERGRIS HAIR POWDER.

Add to the above stock perfume 4 times the quantity of ground starch; rub them well together, and run the whole through a sieve; put in paper bags or boxes.

SPIRIT OF AMBERGRIS.

Compound.—Take ambergris, 1½ ozs; musk, 30 grains; civet 20 grains; reduce the the whole to fine powder with a little loaf sugar; add to this the juice of a fourth part of a lemon; add 3 pints of alcohol. Stir up occasionally for some days, and also keep it in a warm place. It may be filtered through white blotting paper. Simple.—Dissolve 2 drams of ambergris in a pint of alcohol, placing the bottle in a basin of hotwater; when the water in the basin has become cold, the solution is finished. Where heat is recommended always use the Florence flask of Jena glass.

AMBERGRIS SOAP.

To 7 lbs. of cord soap melted in a copper or pan, add ¼ oz. of oil of caraway, ½ ozs. of Ess. bergamot, and ¼ oz. of spt. ambergris. Mould as usual.

ESSENCE AMBERGRIS.

Ambergris, 5 dr.; musk 1½ dr.; essence d'ambrette (or purple sweet sultan), 1 qt. This produces the finest quality of the London West End and Paris houses.

EXTRACT AMBERGRIS.

Spirit of Rose, 6 ozs; Tinct. Ambergris 16 ozs; Tinct. musk, 8 ozs; Tinct. Vanilla 2 ozs: mix.

Ambergris or its tincture, extract, or essence enters into many compound essences, some of which are given here.

ESSENCE BOUQUET.

Spirit of Rose, 8 ozs.; Tinct ambergris, 2 ozs.; Tincture orris, 4 ozs; oil Bergamot ½ oz; oil lemon ¼ oz Mix.

ESSENCE MAY BLOSSOM.

Essence of orris, 500 parts; triple ext. of rose, 250 parts; ext. of jasmine, 100 parts; essence of ylang-ylang, 10 parts; essence of ambergis, 25 parts; oil of orange, 10 parts; of citron, 20 parts; oil neroli, 5 parts. Mix. A very fine perfume.

PARFUM DES ROIS.

Alcohol 2 gallons; styrax, 60 ozs; gum benzoin, 16 ozs; aloes wood, 8 ozs; spirit rose, 2 pints; spirit orange flower 2 pints; Tinct. ambergris, 8 ozs; Tinct. musk, 8 ozs. Tinct. vanilla, 16 ozs. Macerate for a few days and then filter and bottle.

On Marbling Paper and Bookedges.

[Owing to persistent demand for the article we need not make any apology for reproducing it from the highest standard authority obtainable —Ed. I.]

TOOLS.

These include wooden troughs, a skimmer, a stone and muller, pipkins, Brushes and rods.

Wooden Trough.—This is made of inch deal about 1 3/4 inch in depth, and ½" in length and breadth larger than the sheets of paper that are to be marbled. This proportion between the size of the trough and paper should always be observed, to prevent waste of colour; of course, troughs of various sizes will be required, where paper of various sizes is to be marbled. The trough

must be watertight and the edges of the sides of it must be sloped or bevelled off on the outside to prevent any drops of colour which may fall on them from running into the trough and sullying its contents.

A *Skimmer* or clearing stick must be provided for each trough ; this is a piece of wood, 2½ inch wide, ½ inch thick, and as long as the trough it belongs to is wide inside ; the use of this will be explained hereafter.

A *stone and muller* of marble, or some other hard stone, the size according to the quantity of colour required to be ground. Also a flexible knife, for gathering the colour together.

A dozen or two of small glazed *pipkins* to hold colours in The pots being furnished with

Brushes made as follows : take a round stick about as thick as your finger, and cut a notch all round one end of it ; next take some bristles, 4 or 5 inch long, and place them evenly roundly the stick at the notched end, letting them project 1 3-4 inch beyond the wood ; fasten the bristles to the stick by several turns of stout thread ; cut away the ragged bristles, and tie up the brush firmly with fine cord. The use of the notch round the end of the handle is to make the bristles spread out when firmly tied up, so that when used the colour may be scattered about more abundantly.

Rods for drying the paper on when marbled ; they should be round, at least on the upper side, and about 1¼ inch in breadth and thickness. Twelve rod 11 ft. long will hang 3½ quires of demy, or 4½ quires of of foolscap.

COLOURS.

Red: —Vermilion, droplake, rose pink, venetian red red ochre. *Blue* :—Indigo blue, prussian blue, verditer. *Orange* :—Orange lead, orange orpiment. *Black* :—Ivory blue black. *Yellow* : —Dutch pink, yellow ochre, kings yellow, English pink.

The finer the colours are ground, the better and the cheaper will the work be. First the colours should be finely pounded, then mixed with water to the consistence of paste, and put in a colour pot with knife. From the pot, the colour must be taken out a little at a time, and levigated very fine with pure water.

Compound colours are made by mixing the colours above mentioned in certain proportions. To make a *red* colour, mix 3 parts of rose pink with one of vermilion. A *finer red* 4 parts of rose pink, 2 of vermilion, and one of droplake ; for very fine work use droplake alone, but use it sparingly, for it is a a dear article. *Yellow* – 2 parts of Dutch pink, and one part each of king's yellow and and English pink. *Green*—Made by mixing blue and yellow. *Darkblue*—Indigo, which may be made lighter by the addition of verditer. *Orange brown*—2 parts of venetian red,and one part of orange lead.A fine *orange* —put some fine yellow ochre in a laddle over a fire and keep it there till it assumes a dark red colour. Take of this red ochre, finely pounded, and add a little orpiment or rose pink ; mix all well together. *Umber colour* equal quantities of venetian red, orange lead and ivory black ; this can be lightened with orange lead, or darkened with ivory black. *Cinnamon colour* —venetian red with a little prussian blue. All other colours which may be wanted can be made

by mixing together those already described. In addition to the articles already mentioned obtain a bottle of ox gall, a bottle of good oil of turpentine some pure water. The trough must be filled to with in 1-8 inch of the top, with a solution of gum tragacanth, which is prepared as follows: Gum of a pale white semitransparent appearance is to be soaked in water for at least 48 hours, in the proportion of ½ lb to 1½ gallon Pass the solution of gum through a hair sieve or linen cloth, and pour it into the trough. In all cases, when the trough is to be used, the solution should be well stirred up with a few quills, and the surface of it cleared from film by the skimmer above described.

Colours intended to represent veins are made by adding a small quantity of gall to the various colours, and stirring each well up with brush. in order that they may be properly mixed. Previous to use these mixtures of colour and gall are thinned with water to the consistence of cream, and well stirred up.

Colours for producing spots like Lace work.—Take some dark blue, or other colour, add some gall to it, and about as much or a little less. of turpentine; stir all well together, and dilute with water. To try the colours throw on the solution, by shaking the various colour brushes over it some spots of colour. If the spots spread out larger than a crown piece in size, the colours have too much gall; if the spots after spreading out a little contract again, there is too little gall in them. In the one case, more colour must be added, in the other more gall. If the colours are in good order, and paper is to be marbled, the whole surface of the solution in the trough must be covered by colours, in spots, streaks, or whirls, according to the pattern required, and laid on according to directions which will be given presently. The paper should be previously prepared for receiving the colours, by dipping it overnight in water, and laying the sheets on each other with a weight over them. The sheet of paper must be held by two corners and laid in the most gentle and even manner on the solution covered with the colours, and there softly pressed with the hand that it may bear everything on the solution, taking care not to let the colours flow on to the back of the paper any more than can be avoided. After which it must be raised and taken off with the same care, and then hung to dry over the rods

PATTERNS.

(a) Throw on red till the solution is nearly covered then some yellow, black and green; add if desired, a little purple with plenty of gall and water in it; twist the colours into any shape by means of a quill.

(b) Throw on red, yellow, black and green, as before; but, for a fast colour, add some of the dark blue mixed with turpentine

(c) Throw on red, yellow, black and green, in the desired proportion, then with a quill draw lines through the colours; after which throw on a greater or less quantity of blue, green, pink, or purple, much diluted, and containing plenty of gall and turpentine.

(d) Throw on very fine red for veins; then plenty of the turpentine blue. If the colours are good, this produces a handsome pattern in a short time.

(e) Throw on some dark blue mixed with turpentine, and take this up with a paper previously stained of a yellow, light

blue, red, pink, or green colour. To obtain a good green for this purpose, boil french berries in water, add a little spirit or liquid blue and carefully brush over the paper, which must be good and well sized, with this mixture.

When the colours become too thick for use, add fresh ground colour with water and a little gall to them, and stir them up well. Be particular in getting good turpentinel When the solution of gum gets dirty, throw it away and make a fresh one. The neatest and most convenient method of marbling the edges of books is to dip one volume at a time doing the ends first and throwing back the boards to do the fore-edge; observing to hold the book tight with both hands, and not to dip deeper than the surface, to prevent the solution from spoiling the book It is the safest way to tie the book between boards before dipping; and, for the sake of convenience and economy, when only a few books are to be marblad, a small trough should be used

Marbled paper is glazed by a machine similar to that with which cottons are glazed. But a machine of this kind would only be required by those who marble very largely. Book edges are polished by the agate burnisher, and so might small pieces of paper be polished, which were required for any particular purpose. Good common pressing, or hot pressing, might serve as well as glazing. For any fancy work it would have a fine effect to varnish the marbeled paper after it had been put to its destined purpose and had become dry. Paste and all moisture chase all the glaze away. The application of a coat of varnish subsequent to the application of paste would be the beauty of the best marbled paper, and much improve the common kind, at a trifling expense,

It will be seen that this art is a very beautiful, simple and lucrative one. Little boys as well as grown up persons will find it amusing as well as an earning one. Put it requires patience, practice and skill to become a master marbler.

Indian Students in America.

In pursuance to many enquiries we give the following from the Bulletin of the Hindustan Associations, U. S. A. These should have very careful attention of the Indian Students proceeding to U. S A.

(1) There are nearly 20 first class institutions in the U. S. A. equal to the best in the world which teach Literature, Arts, Economics (theoretical and applied) Science of Government, Sociology (theoretical and applied), Education, all the Pure Sciences and the Applied Sciences, like all branches of engineering, medicine and surgery, agriculture, chemistry, physics, etc., in fact all branches of human knowledge. The equipment of laboratories and libraries in nearly all of these is complete to be found only in some of the best Universities of Europe. There are many technical schools and colleges where practical and theoretical training in all branches of engineering can be had at a moderate cost.

(2) Graduates in the science courses of the Indian Universities will find here unlimited opportunities for practical training and research work in the laboratories, which they can never find in India and only with much expense in Europe. After graduating from here they can also find profitable

employment as assistants in various experimental stations and as engineers and chemists in factories as many of our students are doing, and in this way they can get valuable experience and command good salary.

(3) Graduates of Indian Universities who have studied systematically the history, philosophy, art, literature and civilization of India, can find opportunities as lecturers and professors in the American Universities and will thus be doing an immense service to both the countries.

(4) No one should come to America as a student unless he has passed the matriculation examination in India and he should then be prepared to study in the high schools of America for about two years before he enters the University. To be able to enter the American University and pursue their studies with satisfaction, students must have passed the intermediate examination (First Arts) in India or at least have read up to its standards. We would not advise any body to come who does not possess good health, earnestness of purpose and good character.

(5) Self-support is possible all throughout the country, but it is difficult, though not impossible to work and go to college at the same time. Only those that are resourceful, energetic, hardworking, and earnest can succeed. A few of our selfsupporting students have failed though many have succeeded. The life of an entirely self-supporting student is very hard and trying and they should be prepared to undergo all kinds of hardships which are recompensed when successful, by the supreme joy of a self-made manhood.

(6) We would advise students intending to be self-supporting to have a practical knowledge of the following, before they start from India Carpentry, surveying, brick laying or plastering, which are well paid trades in America.

(7) No student without any serious purpose should come to America. Life in America is no plain sailing, but full of hard knocks. Neither is education or degrees easily obtainable. They will require just as hard and more conscientious work as in India, but with the difference that it will bring increasing interest in the work and power and faith in one's ability. Sentimental young men with exaggerated opinion of their powers should not come as students.

(8) Students whether self-supporting or otherwise, should have at least Rs. 350 to 400 with them when they land in America as they will be required to show Rs. 150 to the immigration officers before they are allowed to land. It is advisable that they should have more money-expenses for at least four or five months. To avoid trouble we would advise students to land in New York or in Seattle and between Europe to America or Japan to America they should travel second class. Information about steamers and rates can be obtained from the steamship offices in Calcutta and Bombay. Students should better bring their University certificates and also of the college of last attendance with mention of subjects studied. If the students should write to the local officers of our association in advance, the name of the steamer and the date of arrival, they will arrange to meet them at the time of landing and help them in all possible ways. A little study of the map of America will be very helpful.

(9) One of the main purposes of our association is to help our fellow students in India to come to America for education. The benefit of our experience we will be always glad to extend to them. We pray earnestly that worthy and serious students may come in larger numbers as there is room for thousands of our students in the schools and colleges of America. The general secretary will gladly furnish all information about education in America. But enquirers are requested to remember two important points : (i) our time is limited and valuable, and no one should write for idle curiosity ; (ii) all letters to America require two and one-half annas as postage (and not one anna) and if a personal reply is wanted two and one half annas stamps should be enclosed with the letter, otherwise no letters will be answered. For general information students in India may write to our representative, Mr. K. C. Das, 1 Anthony Bagan Lane, Calcutta, and if a reply is expected stamps should be enclosed. It would be advisable to meet Mr. Das personally and his suggestions would be helpful as he had six years' experience in different parts of America.

Small Trades & Recipes.

Perhaps no one is unaware that we import some lakhs of rupees worth of toys every year, but it is a pity that we don't try to manufacture them here, though the art requires neither much skill nor a large capital. Everyone has seen Chinese paper flowers, which, when thrown into a basin of water, 'buds out' as it were. These flowers have a large sale. Our young boys may be taught this art for their pleasure & profit. The outfit for making these flowers costs only 5 rupees and can be had from Harrods' stores of London, who give the full instructions with each box, Why not give these to our little ones and teach them to live independently from their boyhood.

Still another art is giving means of livelihood to many persons,—we mean the art of fancy paper work. We see how beautiful things are made out of coloured papers, such as fruits, chandeliers, fans, etc. This art also requires neither skill nor money. Indeed a skilled man may easily earn a good income by learning this art.

Can't you prepare tin-made articles and give them the appearance of mother-of pearl and thereby earn a good income ? Heat the articles a little by placing them over an iron caldron. See that the solders used in the article are not melted away. Then dip the articles immediately in a dilute solution of nitro-muriatic acid for a few seconds. Take them out, wash in water, dry, and coat with lacquer varnish or any transparent colour.

RED INK.

Carmine	20 grs.
Liqr. ammonia	3 ozs.
Dissolve, then add of	
Gum arabic	18 grs.

Half a drachm of powdered droplake may be substituted for the carmine where expense is an object. This ink produces a very superb colour.

ROSE LOZENGES.

Otto de Rose	5 to 10 drops
Citric acid	3 drams
Sugar	1 lb.
Mcilage	q. s.

Some makers add of Starch 4 ozs.; substitute oil of rhodium or oil of rose geranium for the otto and tartaric acid for the citric, and use mucilage made with rose water; but the quality of course suffers.

SPANISH CHOCOLATE.

Caracas cocoa	22 lbs.
White Sugar	6 lbs.
Vanilla	2 ozs.
Cinnamon	4 drs.
Cloves	1 dr.

The vanilla is reduced to powder by rubbing it with a little gugar, before adding it to the paste. Cinnamon and cloves must be powdered also.

LEMON CREAM.

Cream	1 pint
Yolks of eggs	3
Sugar	6 ozs.
Yellow rind of lemon	1

Mix the juice of the lemon; apply a gentle heat, and stir until cold. If desired white, the whites of the egg should be used instead of the yolks.

LIQUID GOLD.

Agitate ether with a solution of terchloride of gold for sometime, allow it to repose, and decant the supernatant portion. Naptha and essential oils possess the same property as ether of taking gold from its solution; the first has the advantage of cheapness This liquid was formerly held in great esteem as a cordial medicine. It is now only employed for writing on steel, gilding, etc. As it dries, it leaves a coating of pure gold.

Reference Directory.

Dealers in Aniline Dyes.

(1) Dadaji Dhakji & Co., 10-1, Portugese church st. (2) Don, Watson & Co., 5, Commercial Bldgs. (3) Makhan Lal Fateh Chand & Co., 27, Old China Bazar St. (4) A. C. B. Sethia & Co., 108, Old China Bazar St. All of Calcutta. (5) Farbenfabriken, Bayer & Co., Ltd., Alice Bldgs, Hornby Road, Fort (6) Leopold Casella & Co., Sirdar's Palace, Apollo St. (7) Meister Lucius & Burning, Ltd. Cox's Bldg., Hornby Row. All of Bombay (8) Govind Ram Herpershad & Co., Rawatpara, Agra. (9) Oomersey Hirzi & Co, Hattras.

Coir Merchants

(1) A. G. Ahmad & Co., 35, Market St., Calcutta (2) Dymes & Co., Ltd, Broadway, Madras (3) D'silva & Sons, Perumathurai, Travancore. (4) Wm. Goodacre & Sons, Ltd., Br. Cochin. (5) D. Maneckjeee & Co Calicat, Malabar. (6) Peirce, Leslie & Co., Ltd., Calicut, Tellicherry, Malabar. (7) P. Ramalingam Pillay, Br. Cochin. (8) The Western Coast Trading Agency, Trivandrum, Travancore.

Confectioners.

(1) Calcutta Bakery & Genl. Store Supply. Co, 66, Beadon St. (2) Castelazzo Bros.,

Chowringhee Road (3) G. Isaia & Co., Free School St. (4) P Marchetti, Park St. (5) Federico Peliti, Govt. Place, East.. All of Calcutta. (6) The City Restaurant, Broadway, Madras. (7) Mongini Bros., Church Gate St., Bombay. (8) Abdul Gaffur & Bros., Police Bazar, Shillong (9) T. Valerio, Naini Tal. (10) Woodland Hotel, Cashmere Gate, Delhi.

Curio Dealers

(1) Kwong Yen Sing & Co., 2, Dalhousie Sq. Calcutta. (2) Framjee Pestonjee Bhumgara, Mount Road, Madras (3) Nadirshaw Bomonji & Co., The Japanese Bazar, Hornby Road, Fort. Bombay. (4) Indian Stores, Benaras City. (5) Bhola Nath & Shew Narain, Naini Tal. (6) Gopi Chand Dhore. (7) Noor Bux Khoda Bux & Co., Both of Jaipur. (8) Master & Co., Darjeeling. (9) Kishan Chand, Chadni Chowk, Delhi. (10) Tujoomal Dhalamal, B. Road, Mandalay, Burma.

Fruit Dealers.

(1) Butto Kristoo Dutt & Co., Shovaram Bysac's 1st. Lane, Colootolah, Calcutta. (2) Bombay Fruit Co., Opposite Crawford Market, Bombay. (3) Allahdia Gulan Mohamed, Saharanpur. (4) Parwat Bag Fruit & Vegetable Garden, Ranikhet Almora. (5) Bisharatganj Fruit & Vegetable Gardens Ramgarh, Kumaon. (6) Emmanagar Fruit Gardens, P. O. Deohri, Fyzabad. (7) Kashmir Vineyard, Srinagar, Kashmir. (8) Kotgarh Fruit Gardens, Kotgarh, Simla. (9) The Krishna Nursery. (10) The Muzaffarpur orchard Both of Muzaffarpur. (11) Mysore Fruit Syndicate, Ltd., Bangalore. (12) Rustomjee Byramjee Iranee, Quetta. (13) International Stores, Chatham St., Fort, Colombo, Ceylon.

Bicycle Manufacturers of England.

(1) The Birmigham Small Arms Co., Ltd, 45, Small Heath, Birmingham. (2) Humber, Ltd, Coventry. (3) Truimph Cycle Co., Ltd., Coventry. (4) Centaur Co., Ltd., Stoke, Coventry. (5) Reliance Cycle Mfg. Co., Manchester St. Liverpool. (6) Wm Whitely, Ltd., Queen's Road, London, W. (7) The Enfield Cycle Co., Ltd., Redditch. (8) Kynoch, Ltd., Witton, Birmingham. (10) Rudge Whitworth, Ltd, Coventry. (11) Lyon Cycle Co., 22, Benacre St. Birmingham.

Postage Stamp Dealers.

(1) L. S. Chadlick, Streatham Hill, Brixton, London, S. W. (2) Wilfred Sydney, Rozelle, Dunheved Road, South, Thornton Heath, Surrey. (3) Errington and Martin, South Hackney, London. (4) J. Wheeler and Co., 124, Lennard Road, Beckenhan, All of England.

Soap Making Machinery & Requisites.

(1) Hersey Mfg Co., South Boston, Mass., U. S. A. (2) W. J. Bush & Co., Ash Grove, Hackney, London. (3) James Honchin, 13 and 15, Bridgepost Place, New North Road, London, N. (4) F. Read & Co., 10, Lower Charles St., Clerkenwell, London, E. C. (5) W. J. Fraser, London. (6) Mc. Andrews, Morland & Co., Bancroft Bldgs., Liverpool. (7) A. Saalfeled & Co., Manchester. (8) . E. Rost & Co., Machine Works, Dresden, Germany.

Reference Catalogue of Books, Etc.

Books on Leather.

(1) Leather manufacture, by A. Watt, Rs. 10 15. (2) Leather manufacture, by L. A. Flemming, Rs. 21-14. (3) The manufacture of Leather, by Bennett, Rs. 14. (4) Monograph on Tanning and working in Leather in Madras Presidency, by A. Chatterton, As. 6. (5) Tanning and Working in Leather, by E. J. Closton, Rs. 2-8. (6) Leather Dressing, by Lamb, Rs. 21. (7) Modern American Tanning, Rs. 17-8. (8) Leather Industries, by Procter, Rs 15-12. (9) The Leather Worker's Manual, by Standage, Rs 6 9. (10) Leather Trades Chemistry, by Trotman, Rs. 13-2. (11) Practical Treatise on the Leather Industry. by Villon, Rs. 18-6. (12) Leather Trades Review, Weekly, Annual subscription Rs. 10-8.

Journals on Milling.

(1) Miller, monthly, Annual subscription, Rs. 12-8. (2) Miller's Gazette, weekly, A S Rs. 13. (3) Milling, weekly, A. S. Rs. 18-12.

Books on Alkali, Ammonia Etc.

(1) Alkali Trade Manual, by J. Lomas, £ 1 10s. (2) Coal Tar and Ammonia, by Lunge, 2 vols, Rs. 36-12. (3) A Theoretical and Practical Treatise on the manufacture of sulphuric acid and Alkali with the Collateral Branches, by Lunge, Vol. I. Rs. 39-6. Vol. II Rs. 36 12. Vol. III. Rs. 26-4. Vol. IV. (In the press). (6) The Chemistry of the Coal Tar Dyes, by J. W. Fay, 16s. net.

Book on Dentistry.

Dentistry, by C. Huntur, 3s. It is published by Crosby Lockwood & Son, 7, Stationers' Hall Court, Lungate Hill, London, E. C.

Books on Patents.

(1) Patents, Designs and Trade marks: The Law and Commercial usage, by K, R. Swan, 6 net. (2) Patent Rights, by G G M Hardingham, 1s. 6d. net. (3) Inventor's Manual. 1.00.

Books on Bee Keeping.

(1) Bees and Bee keeping, Vol. I, by Cheshire, Rs. 6-9. (2) Modern Bee keeping Handbook for cottagers, by Cowan, As. 8. (3) The A B C and X Y Z of Bee culture, by Root, Rs 6. (4) Bees for Pleasure and Profit, by Samson, As. 14. (5) The Book of Bee keeping, by Webster, As. 14.

Books on Type-writing.

(1) The Principles and Practice of Type writing, by C H Kirton, Rs. 2-3 (2) Modern Touch Typewriting, by K V Moore Re 1-14 (3) Modern Typewriting and Manual of Office Procedure, by Morton, Rs 2-3. (4) Teacher's Key and Handbook to above, by the same, Re. 1-4 (5) How to teach Typewriting, by K. Pickard, Rs 2-10. (6) Pitman's Typewriter Manual. Re. 1-14.

Foreign Journals on Trade & Commerce.

(1) Anglo-Japanese Gazette, monthly, 8s. (2) Board of Trade Journal, weekly, 17s. 4d. (3) Br Empire Review, monthly, 8s. (4) Br. Trade Journal, annual, 10s. (5) Br. Trade Review, 8s (6) Chamber of Commerce Journal, monthly 7s. (7) Commercial Intelligence, fortnightly, 10s 10d. (8) Commercial weekly statement, £1 1s. (9) Daily Commercial Report, £3 3s (10)

Hire Trader's Record, monthly 4s. (11) Japanese Journal of Commerce, Quarterly, 3s. (12) London Commercial Record £1 10s (13) Manufacturers Price current, quarterly, 10s (14) Mercantile Guardian, monthly, 6s. 6d (15) Monthly Statement of Colonial and Foreign Produce, 10s 6d (16) Public Ledger, Daily, £4 17) System, monthly 16s The above journals can be had from Messrs Wm Dawson & Sons, Ltd, Bream's Bldgs, 121, Cannon St, London, E. C., England.

Scientific & Industrial Topics.

Intensive Culture of Poultry

Experiments have been in progress for some months now at Poole, England, on Mr. Randolph Meech's farm, to increase the rate of growth by applying high frequency electrical currents to the intensive poultry houses. Some 3,000 birds will have been treated by June It is usually found that the rate of growth is accelerated by about 50 per cent., while the mortality among the very young birds is largely reduced. An interesting point recently observed is that despite the quicker growth of birds, their appetite is less, probably owing to better digestion and metabolism. The apparatus employed is the result of experiments which have been made during the past three years by Mr. Thorne Baker. It provides a mixture of intermittent positive electrical discharges and a high frequency oscillating field. A heavily insulated wire helix is wound round the "flats" in which the birds are grown, and the electrical fiield produced is sufficiently intense to illuminate a neon vacuum tube if laid inside the "runs". Experiments are now being conducted with a view to determining the relative effects of frequently short applications and occasional long ones.

Jointstock Activities.

Inspite of the bank faliures, gloomy outlook, etc. the joint stock activities are going on slowly and steadily. We read :— Twenty four joint stock companies were registered in Br India in February last with a nominal capital of nearly 173 lakhs. These comprise 4 banking and loan companies (5 lakhs); 5 insurance companies (1 lakh); 1 navigation Co. (24 lakhs); 1 Ry. Co. (50 lakhs); 1 printin, publishing and Stationary Co (Rs 20,000); 7 trading companies (10 lakhs); 1 cotton mills Co (9 lakhs); 1 tea planting Co. (1½ lakhs); 1 land and building Co (15 lakhs) and 2 other companies (56 lakhs). Of these two one is the Bandmann Variety and Asiatic Cinema Co with a nominal capital of 6 lakhs and the other is the Cosmopolitan Cinema Co. with 50 lakhs as nominal capital. Of the Banking Companies Bengal claims 3, two being in Rangpur and the other in Brahmanbaria 4 of the 5 insurance companies are in Bengal, two being in Dacca. The navigation Co is the Anglo-Oriental Navigation Co. of which Messers Andrew Yule are the managing agents and the land and building Co. are the live Building, Calcutta" It would have been interesting to learn how many of these are financed and managed by our countrymen. Surely this does not reflect much credit on us.

A new Ice making machine.

A new French domestic ice machine is being put on the market by the Societie minimax which is slient and automatic and makes up to 50 lbs. of ice in each operation

by the expenditure of 60 grammes of petrol, value one anna. It is a very simple machine consisting of two cylinders connected by a hollow shaft. The Second Cylinder contains a large hollow worm on which the ice is formed. The Cylinder Contains a solution of chloride of zinc which is heated by a row of burners and the steam escape into the Second Cylinder which is cooled by water from a tap. At the end of 27 minutes this operation is complete and a bell rings. The Second Cylinder is then filled with a water jacket covering the worm and the first Cylinder is cooled by the tap resulting in the rapid absorbtion of heat from the second cylinder which freezes the water round the worm. The ice is taken out in two half tubes.

Notices & Reviews.

Blue Black Ink Powder and Nimak Sulemani.

Mr. Radha Mohon, Central Bank Ltd., Beawar, has kindly send us two packets of the above substances. They are good articles and we can recommend them to the public. Try to improve the labels. It would be better to sell the Nimak Sulemani in small phials, as it absorbs water vapour from the atmosphere during the rains. You ought to have quoted the prices.

Indegenous Lozenges.

We have the pleasure to receive a box of lozenges from the Sindh Lozenges Mfg., Co., of Sukkur. The lozenges are good and can compare favourably with the imported ones. The labels are all that can be desired, but it would be better to sell the lozenges in wide mouthed phials or bottles for making them attractive to those for whom they are intended.

"Indian Agricultural World."

It is with great pleasure that we receive the inaugural issue of the 'Indian Agricultural World,' a High class Illustrated monthly of Agriculture, co-operation and cognate subjects, edited by that well known writer, Mr. P. A. V. Iyer of Madras. The number under notice contains 100 pages of reading matter, treating of a variety of subjects, including Planting, Forestry, Gardening, Vaterenaries, Agricultural Education, the Industries, the statistics and the Commerce of Agriculture, Engineering and Law and Legislation, Agricultural Economics and rural economy, dealing with the inner polity of the Indian village. The number gives prominence to two very remarkable articles: "Success in Farming," by Mr. D. T. Chadwick, M. A., I. C. S., Director of Agriculture, Madras, and "Co-operation in Agriculture," by the Honble Dewan Bahadur L. D. S. Pillay, M. A. B. L. L. L. B., (London) Registrar of Co-operative Societies, Madras. If agriculture has been called the Mother of the State and in a country like India where 80 per cent of the population are agriculturists, the need for such a journal is obvious. The printing and get up of the journal leave nothing to be desired On the whole, the Publishers, Messers P. A. V. Iyer & Co., Triplicane, Madras, S. E., are to be congratulated on their remarkable enterprise. The annual subscription is Rs. 10 only. We wish our contemporary a long and useful career.

Industry Buyers' & Sellers' Guide.

Messrs Lalchand Doolahmal, Shikarpur.—They can supply Kandhar dried fruits, groceries, spices, rice, and tobacco at moderate rates. (2) Wants addresses of the diamond merchants of the World.

K. Venkatachalam, clerk, water supply sub-division, military works services, Secunderabad, Deccan.—Wants to buy indegenous biris in large quantities regularly from Calcutta.

C. Govindarajalu &Sons, 29 next to P.O., Cuddalore O. T.—Informs T. S. S. of Kannadiputhur that they are the sole agents for the Bartell Floss Candy making machine. For rope making machine write to Earnest. Lebmann, Manchester, England.

J D. & Sons, Kunsgat, Agra City.—Wants addresses of firms of Bombay and Calcutta which sell gold paint and Atlas brand sand paper at cheap wholesale rates.

M. V. Gadgil, First Khatar Lane, Bombay, 2.—Wants to dispose of the following books at reasonable rates: (a) the book of the Pearl, by Kunj and Stevenson; (b) Precions Stones, by A. H. Church (c) Precious stones, by W Goodchild; (d) Precious stones, by Fernie.

S. Mani Bros, Trichur, S. India.—Wants to buy a copy each of old Kelly's and London. Directories. Wants addresses of English and American Manufacturers of Typewriters and their accessories

T. Narayan Rao, Gudniada.—Wants addresses of dealers in brass vessels.

K. E. Siva Raman, Kalpathi, Palghat.—They are exporters and importers. Can undertake travelling business. Wants agents all over India, Burma and Ceylon.

Krishna Das, Chunar.—Informs D. T. A, Gauhati that he can supply him with a secondhand lithoprinting press on monthly hire purchase system. Wants addresses of exporters of myrabolams.

V Vaduvil Pillay, Palavangady, Trivandrum.—Wants buyers of Tapioca tubers.

Durga Kripa (Illegible), Hari Cottage, Chittagong.—Wants to buy mendets.

Lalchand Doolahmal, Shikarpur.—Wants to buy arrowroot rhizomes.

S. Gaurisanker, student, Forest Training School, Balaghat.—The prices quoted were current in 1889, but it has increased lately.

G. Das, Panasa, Jujpur.—Wants buyers of lac in large quantities.

U. Ghose, 31, Tatarpur, Bhagalpur.—Informs J. P. Jalalpet that he has got one Oxypathor and has got good results. If J. P. wants to buy he can effect a reduction of price if he purchases through him.

The Laxmi Trading Co., Botad.—Informs J. Rao, Chicacole, that they are the sole agents of the Dubied Knitting machine of Messers Edouard Dubiet & Co., Couvet, Switzerland. They can supply to the readers of Industry, with one Bromide enlargemant 16 ins by 20 ins for Rs. 1-8 only for a month only

Station master, Karmad, Nizam's State Ry.—Wants buyers of 200 or 300 eggs daily.

S. C. Barooah, Laimakmi, Dibrugarh.—Wants buyers of sawdust in any quantity.

D B. Subramania Aiyar, Colour Merchant, Shevapet, Salem.—Informs J. D. J., Ceylon, that he can supply him with cotton carpets of fast colours.

South Indian Cash Trading Co., Com-

mercial Road, Ootacamund.—Wants to buy soap moulding machine.

A. C., Allahabad.—Wants to dispose of copies of Industry from 1910 to Sept. 1913 excluding the March 1911 issue.

Motiram Dadaji, Villa Co, (Illegible), Padar.—Wants to buy Tea and black Asafœtida. Asks if any one is willing to appoint him as a sole agent for Bombay and also such firm or firms who would inform him daily of the rates of gunny bags F. A. S. Calcutta and C. I. F. Hamburg and undertake shipments of same with gurantee of goods at destination. Customers are requested to send samples of all qualities and on receipt of same he will send trial order. Payment cash against documents in Bombay.

R C Dutta 19, Mall Road, Almora.—Wants to dispose of 300 volumes of medical books in the French language

Durga Sanker, Forest officer, Rajgarh, C. India.—Informs L Diaz, Coonoor that he can upply him with hedgehogs. Wants buyers of Tendoo leaves used in making biris and Cardia myxa.

T. K. I, Antikad.—For wood distillation plant please write to Blair, Campbell and McLean, Woodville St., Govan, Glasgow, mentioning Industry.

B L S., Bankura.—For books on brick making please write to Thacker Spink & Co., Calcutta mentioning Industry.

P. C. S., Kalighat.—The book can be had from the office of the Indian Industrial Conference, Amraoti, Berar.

Dr G. B. N, Kanuod.—Wants address of Indian firms which sell Ice making machine.

The Pollachi Cycle Trading Co., Pollachi.—Wants quotations of black celluloid rings. Wants to know where advts. on enamelled sheets are printed.

S. A. Rekheshwar D. D. R., Pratapgarh, Malwa.—Wants to buy seeds of American and Egyptian cotton.

J. B. S, B A, Ashrafabad, Lucknow—Consult any new edition of arithmetic for your requirements.

Sadhu Ram Bhalla, Sunam, Patiala.—Wants buyers of used postage stamps of Patiala, Nabha and Jhind

D. R. A, Tiruvonam.—Write to the principals of the Pusa and Sabour Agricultural Colleges. You can get the Govt. publications on Agriculture from Thacker, Spink & Co, Calcutta, at nominal rates. In this side of India we have agricultural stations at Dacca, Burirhat, Rajshahi, Rangpur, Chinsurah, Burdwan, Kalimpong and Chittagong.

Formulas, Processes & Answers, Etc.

How to Mould Paper

Mr. R. V. M, Mysore, writes :—Will you kindly inform me how paper is decomposed for the purpose of casting them into moulds?

Paper is not decomposed but utilized in the following manner :—Paper is boiled in water and beaten in a mortar or pulping engine till they assume the consistency of a paste, which is then boiled in a solution of gum arabic or of size to give it tenacity. The moulds are curved in the usual way, and oiled, and the pulp is poured into them, a counter mould or core being employed to make the cast nothing more than a crust or shell, as in plaster casts.

Test for Honey.

In response to a query in last November issue the Managing Director of the Pharmaceutical Works, Lahore, has kindly sent us the following note.

Honey is mostly adulterated with inverted sugar syrup, etc. 2.2 lbs of highly purified sugar is dissolved in 10 ozs. of pure water, 17 grains of tartaric acid is added and the whole mixture is heated at 110°c. until golden colour is developed ; this process requires about 3/4 hour. This artificial honey is perfumed with the artificial perfume of honey or with a little genuine honey to give aroma. Take half to one gramme of sample to be tested and place it in flat porcelain dish and 2 drops of fresh resorcin hydrochloride reagent (made by dissolving 1 part of resorcin in 100 parts of hydrochloric acid previously diluted to the strength of 38 p. c.) are added. A characteristic *cherry red* colouration is produced in the case of honey entirely or partially adulterated with inverted sugar. The colour depending upon the amount of invert sugar present. I have found this test sufficiently delicate after trying on good many samples. It is no doubt a preliminary test for the investigators for sorting the samples as on account of the slow inversion which takes place through the HCl in natural honey, oxymethyl furfurol is produced and a positive result is obtained.

Starch from Potato.

H. S. C. Sukkur, writes : Will you kindly state how potatoe starch or flour is prepared ?

In the preparation of starch from potatoes and other like vegetable substances, the roots or tubers, after being washed and peeled, either by hand labour or by machinery, are rasped by a revolving grater, and the pulp washed on hair sieves until freed from feculous matter. Successive portions of the pulp are thus treated uutil the vessel over which the sieves are placed, or into which the washings run, is sufficiently full. The starch held in suspension in the water having subsided to the bottom, the water is drawn off, and the starch stirred up with fresh water, and again allowed to subside. This operation is repeated several times, with fresh water, until the starch is rendered sufficiently pure for commercial purposes, when it is washed, placed on porous bricks to absorb the moisture, and, lastly, air or stove dried. The waste fibres and the washing waters are used as manure.

Laundry Gloss Powder.

Roll No. 4449 writes :—Will you kindly give a recipe for polishing collars and cuffs ?

There are two kinds of glossing material : liquid and powder. We give here the latter. Boric acid, 5 parts ; borax, 3 parts ; stearine, 1 part ; white beeswax, 1 part. Put into a capsule, add sufficient of a solution of sodium hydrate of 20 B., and boil until a homogeneous liquid is obtained ; then evaporate to dryness under a low heat. The dry product is then mixed with the finest rice starch, in the proportion of 1 part to 10 parts of starch. This produces the so-called "Glanzstarke" used in the finest German laundries. Properly prepared, and properly applied, the preparation leaves nothing to be desired, either in the polish or stiffness of the laundry clothing.

To remove Oil Stains from Paper.

Mr. S. V. N, Venkatapuram, writes :—Wants to know a recipe for removing oil stains from paper without causing any injury to the writing.

Hannett says the spots may be removed by washing the part with ether, chloroform, or benzine, and placing between white blotting paper, then passing a hot iron over. A more expeditious, and thought by some the best way, is to scrape fine pipeclay, magnesia or French chalk on both sides of the stain, and apply a hot iron above, taking great care that it is not too hot.

How to Prepare Indigo.

Mr. Maung Po Tau, Prome, writes :—Will you kindly let me know the process of preparing the indigo dye from the plant ?

Indigo is a blue dyestuff extracted from several plants growing in India and America, especially from the leguminous species *Indigofera tinctoria* and *I. Coerulea.* It exists in the plants as a colourless juice. The method of manufacture consists in steeping the plants in water until fermentation sets in ; the colouring matter dissolves in the water, forming a yellow solution which is drawn off from the rest of the vegetable matter, and agitated and beaten to bring it freely into contract with the air for about 2 hours ; this treatment causes the indigo to form and settle down as a blue precipitate ; this is cut, while soft, into cubical cakes, and dried by artificial heat. To hasten the formation of the indigo, a little lime water is sometimes added to the yellow solution. Artificial indigo is threatening to drive out the natural product, but experts are of opinion that though it is cultivated less and less every year, it will never be driven out of the market The reason for this is that artificial indigo's colour fades away in a short time, especially by sunshine and rain. So the uniforms of the blue-jackets are still dyed wilh the natural product. The indigo of commerce contains indigoblue or indigotin, its most important constituent indigo-red, and many other substances, some of which must be regarded as accidental impurities or adulterations.

Imitation Pearls.

Mr. K. M P., Bombay, writes : will you kindly give the process of making imitation pearls ?

These are hollow spheres or beads of glass, perforated with two holes at opposite sides to permit of their being strung into necklaces. A small portion of Essence d' orient is introduced into each, by suction, and is then spread over the inner surface of the glass. When this has become dry and hard, the globe is filled up with white-wax, spermaceti, or gumarabic. The glass of which the beads are formed is slightly bluish and opalescent, and very thin. The latest improvement consists in removing the glassy appearance of the surface of the prepared beads, by exposure to the fumes of hydrofluoric acid, highly diluted.

The Essence d'orient, above referred to, is a pearly looking substance, formed at the base of the scales of the blay or bleak, a small fish of the genus *cyprinus*. The scales are scraped from the fish into a tub containing water, and after agitation and repose the fluid is poured off, and its place supplied with fresh water, and this in its turn, after

agitation and repose, is also poured off. This part of the operation is repeated till the "essence" and scales are perfectly freed from impurities, when the whole is thrown on a sieve, which retains the latter, but allows the former to flow through. After repose for a short time the essence is obtained as a deposit at the bottom of the vessel. Its tendency to putrefaction, while in the moist state, may be obviated by the addition of a little liquor ammonia.

Brief Queries & Answers.

Sobhasingh G. C/o Messrs Lekhraj Mohand, Fazilka—Wants the addresses of Foreign wool merchants.

A. D. Pillay, Ootacamund—Please repeat your queries regarding soaps.

P. M. D. Khasi Hills.—For books on hypnotism please write to Messers Thacker Spink & Co., of Calcutta or to D. B Taraporevalla Sons & Co., of Bombay.

S R. V., Balaghat—The book to suit you is Indian Trees. by Sir D. Brandis, Rs 14.

(Illegible), Bushire.—Wants to know whether there is any paper like Industry in the Urdu language? Messers Jessop & Co, Ltd., Calcutta, can supply you an oil mill.

B. P. Purohit, Saugor.—Tells E. G. V., Alapalachery to write to Mr. Brij Lal Purohit, L. T. M. S., Hoshangabad, C. P., for magic rings and how to prepare them.

A. V. N., Madapur—We do not know whether you can get the 9th and 10th vols. of the Imperial Gazetteer of India separately. Better write to Messrs Thacker Spink & Co., of Calcutta.

Roll No. 4031. Guzrat.—Wants to know (1) how stearine is separated from ordinary cottonseed oil; (2) how ghee is made from cottonseed oil; (3) how potatoes can be preserved in summer in the Punjab?

D. N. B., Shulbari.—The Govt. School of weaving at Serampore teaches weaving practically

L. N. Deo, Chanderi.—For gas producing plant please write to the Central Engineering Co, 516, new First National Bank Bldg, Columbus, Ohio., U.S. A.

M. D. Chellia, Palamcottah.—Wants to know (1) what to buy. sell, or make on the American principle of mail order business; (2) where he can get a hand power printing and a duplicating machine; (3) has any body tried the effects of the ring sold by the Novelty Co. of Simla; (4) where to get Electro-magnetic and Magic rings; (5) the cost of erecting a fruit drying and preserving plant both on a big and a small scale.

G. R. & Co, Ahmedabad.—For a recipe on rubber solution consult page 67 of Vol. IV.

S. S R., Kalimpong.—Wants to know how "zarda" is made. (2) For artistic tin boxes please write to Barringe Wallis & Manners, Ltd., Mansfield, Notts., England. (3) For soap stamping machine write to Tambat Bros., Karla, near Bombay. Wants to buy cottonseed, cocoanut and ground nut oils.

B. D., B. A., S R H. School, Jammu—Wants complete information about the toy industry: capital required, expenses, materials, outturn, profits, etc.

B. D. & Sons, Agra.—Have not received the samples you speak of.

American Trading Co., Rangoon.—Wants addresses of German firms which deal in sewing machine parts. For pins and needles please write to John Edelsten & Co., Warrington, England.

S. M., Jhang.—Is there any book on Embroidery? can he learn it anywhere? can he learn the art of making pottery anywhere in India? For wick and tape making machinery write to Ernest Lebmann, Manchester, England.

S. D. B. & Co., Hafizabad.—Wants addresses of watch manufacturers of Switzerland.

P. J. R., Bombay.—Informs that the Dubied Knitting machine is cheaper in price than of any other make. is easy to handle and light running. The Co. deals very decently with their customers and give them their best advice and help Wants to know how to remove rust from nickel plated articles and tartar on teeth from early boyhood?

H. A., Jaldi—Wants a loan of nearly 3 lakhs of rupees on landed properties.

K. M., Firojabad—The book you speak of is not distributed free now-a-days.

N. N. Roy, Akhaura.—Is there any person who can undertak to repair a "Grisworld" 150 cylinder knitting machine He is ready either to exchange the machine for a new one or pay for repairs of the cylinder and overhandling the whole machine or change the cylinder only.

P. L. Bros., Ambala.—How to refine liquid gum? Prize medals mean medals which are given away as prizes.

M. Adil Khan, Hoshangabad.—Wants to prepare infants food like Dongre's Balamrita. Why not mix brown ochre with the polish? Glycerine or castor oil may soften the leather.

V. S S., Birgudi.—The Empire of India Life Office may be relied on.

J. L., Ambala.—Wants addresses of firms which deal in briquette making machines from saw dust.

R. S. & Co., Bareilly, and K. D. S., Tonk—For information on suitable wood for making matches, please write to the Director Genl of Commercial Intelligence Calcutta.

Lokenath, Pleader, Multan.—Wants addresses of (1) picture dealers of France; (2) firms of America or Europe which buy Carpets, pottery and enamelled goods of Multan.

L. N V., Rampur.—For learning Electrical and Mechanical Engineering by correspondence please write to the Agent, International Correspondence Schools, Ltd., of London, Hastings St., Calcutta.

S. S. N., Veraval.—Wan's to know how liquorice sticks are made from the roots?

Saraswat Soap Factory, Meerut.—Please repeat your queries and write them legibly.

K. R., Jamnugger.—Wants to know how silver threads are gilded.

D. V. P, Bazar Anand.—Wants to know how Madras snuff mixed with gree is made?

U. G. K., Karachi.—Wants medical books with their Urdu translation.

B. D, Batala—For books on aerated waters write to Thacker Spink & Co. of Calcutta.

The Oriental Industrial Bureau. Calcutta.—Edward Davis & Co., 3 Fen Court, Fenchurch St., London, E. C., are mica and mineral brokers.

M. R., Mercara.—For making rubber signature stamps write to G. N. Mytu, Postal Tution School, Bari Dholpur.

Dr. B. D. S., Ramnagar.—Have you read the article on blackings and boot polishes in Vol. IV.?

B. L., Mehsi.—For mother of pearl write to M. Wilton, St. John's Lane, Clerkenwell, London, E. C.

Important Notice.

Those from whom the V. P. P. of the April issue of INDUSTRY returned as refused and those who have not yet responded to our letter calling attention to the refusal, are requested to kindly take note that the June issue of the paper will be sent by V. P. P. for the 2nd time. If any of them be not willing to continue subscription he is earnestly requsted to inform me of his intention.

The subscribers are requested to quote their Roll No. which will be found on the cover of the paper against their names in any communications with this office.

The subscribers who have missed any of the stray copies of Vol. IV. are requested to ask for a duplicate copy early as such despatch of duplicates for Vol IV will be soon discontinued.

MANAGER.

Calcutta Market.

Calcutta, June 8.

EXCHANGE.

Bank T T	1-3 15 16	Firm.
Bank O D	1-3 31-32	
3 Months' D A	1-4 5-32	
6 " "	1-4 5-16	

Government Loans.

3	Per cent cash	... 82 to 83
3 1-2	do "	... 95-14 to 95-15
3 1-2	do month sight	... 95-11 to 95-13
3 1-2	do Bombay	... 95-14

Interest and Discount.

Bank of England from 29th Jan. 1914	3 %
Bank of Bombay from 4th June 1914	4 "
Bank of Bengal from 4th June 1914	6 "
Bank of Madras from 26th May 1914	7 "

BULLION MARKET.

GOLD—	Rs.
English Bar—100 (touch) per tola ...	24-2-6
Australian Bar—(100 touch) ...	24-2-6
Sovereign—Victoria Shield, per piece	15-6-0

SILVER—

English Silver Bar of 17 ¼ dwt better per 100 tollah ...	75-11

PRODUCE MARKET.—May 27.

RICE.

Dwadkhani Rice	Rs 6-8 to 7 per md
Banktulshi	Rs 5-8 to 6-4
Boiled Patna	Rs 5-2 to 5-10
Ballam	Rs 5-9-6 to 5-15
Kazla	Rs 4-4 to 4-6

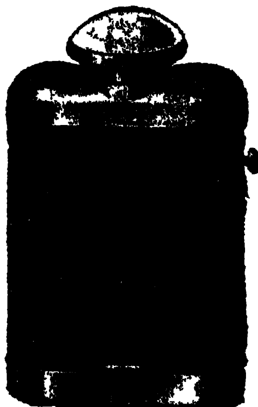
Conquest of the Night.

The Greatest Enemy of Man.

Night has terrors and dangers enough to chill any stout heart.

Nothing but light and Plenty of it can conquer it and afford the needed protection from it

OUR ELECTRIC POCKET AND OTHER INDEPENDENT PORTABLE LAMPS



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Rs. 90 only.

The very thing you have been looking for in this hot season for your Desk, Bed room and Dinning Table.

A Fan worked by common Spirit
No Electric Battery to charge or change.
No clock work
No obnoxious Kerosine Oil Smell and smoke
No Chimneys to break
No burners to get out of order
Absolutely noiseless
Runs 20 hour on one bottle of Mythulated spirit
Very neat clean and beautiful.
Gives cool breeze
Light enough to be carried on a finger

AND VERY CHEAP TOO

Size 15 Inches.

4 BLADES WITH PROTECTOR.

Over all 22 inches, Net weight

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Industry

CONTENTS.

Vol. V,
No 51
June

Royal Ed. Rs. 2-8 People's Ed. Re. 1-8 yearly.

Kashmir & Tibet Trading Co.

Srinagar, Kashmir.

LARGEST EXPORTERS OF KASHMIR GOODS.

KASHMIR SAFFRON.—Short stemmed, finest and most Genuine quality, fresh from Kashmir Saffron fields, and far superior to the best imported Saffron of Spain etc. Per lb. Rs. 40 and Rs. 37-8.

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ROOT MOMIRA.—Finest variety directly imported from Central Asia. Admitted specific for eye diseases. Per tola Rs. 5-8.

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PASHMINA OR ALWAN AND TAFTA.—Per piece about 7 yds by 54 inches, Rs. 35 to Rs. 150.

EMBROIDERED FOLDING CAPS.—On real pashmina ground, As. 14 to Rs. 1-4 each.

FINEST RABBIT SKINS.—In various colours. Hair softer than the softest velvet. Most suitable for collars, also for lining ulsters and jackets etc. Rs. 2-8 to Rs. 5. per skin, size about 1 x 1 feet.

SHIRTING FLANNELS—In various colours, width 27 inches, Rs. 1 per yard.

Comparison is the fairest test to you and to ourselves and we heartily invite it.

PRICE LIST FREE. Telegraphic Address :—SAFFRON, Srinagar.

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OUR SPECIALITIES—Medicines dispensed by able and experienced compounders. Dr. S. K. Banerjee, Graduate, Calcutta, Medical College, attends here daily and treats moffusil patients by correspondence.

Family Box containing 12, 24, 30, 48, 60, 84 and 104 phials of medicines in a neat and handsome teakwood box with a guide of 300 pages in Bengalee and a dropper :—Rs. 2, 3, 3-8, 5-7, 6-8, 8-12 and 11 respectively.

CHOLERA BOX—Containing 12, 24,30, 48, and 60 phials of medicines with a Sankhipta Cholera Chikitsha", (a very useful guide in Bengalee of 160 pages), a dropper, and ½ oz phial of Rubini's Camphor,—Rs. 2, 3, 3-8, 5-7, and 6-8, respectively. In addition to the prices Ans. 8 charged extra for an English guide with the cholera or family box. SARSA VITO—enriches the blood, gives vigor to the system, improves digestion, removes aces and pains, produces refreshing sleep, dispels melancholy and nervousness, and builds up both flesh and strength. Re. 1 per phial. Postage extra. **G. K. Nag & Co.**

The International Medical Hall. **297 (A) Upper Chitpur Road,** ***Calcutta.***

Industry

People's Ed.

A monthly Journal of Handicrafts & Commerce.

VOL. V. CALCUTTA, JUNE, 1914. NO 51.

Indian Pottery & Ceramic Works.



Indian Potters at Work.

(By Munshi Sher Mohamed, Printing Master of Lahore School of Arts.)

From Ind. A. D.

VOL. V. NO. 51.

Indian Ceramic Works.

Like metal, stone and wood works, ceramic works of India had not achieved a wide fame, yet the potter's craft of India in some branches had attained an unrivalled beauty which attracted admiration of critics. Of the ordinary works unglazed plain pottery and unglazed painted and stained or varnished works had and now have extended use among all classes of people. Glazed pottery had been in common use with rich men in decorative works and climax in potter's art in India attained in the manufacture of decorated wares in Cement and Plaster of Paris. Thus the Indian ceramic art is in (1) clay modelling and (2) Plaster of Paris and Cement work.

The various forms of Indian clay modelling both unglazed and glazed, give much food for an interesting study. And workmanship displayed in this branch of pottery is such as to attract admiration from all and the patterns adopted by the village potters of such places Bhowalpur, Alwar, Gujranwalla, Aligarh wrought with classic-like designs are most appreciated by the middle class people A higher art is manifested in these forms of pottery when the designs are incised or carved on the half dry surface colour and varnish given There are many places in India that have a high reputation for this kind of colouring such as Sewan and Khulna in Bengal, Azamgarh and Aligarh in the U. P., Ratnagiri in Bombay, Madura in Madras, and Tavoy in Burma. Lac-coating is another feature of these forms of pottery and these are done by smearing unglazed pottery, after being fired, with lac and other substances to make it impervious to fluids. Besides these, there is another form of pottery throughout Upper India, as also in Madura and Salem in South India, the painted pottery from which, according to a Western authority, much of the modelling and painting of India has been evolved This is intimately connected with the production of idols and other sound objects and with the frescoing of the walls of temples and houses.

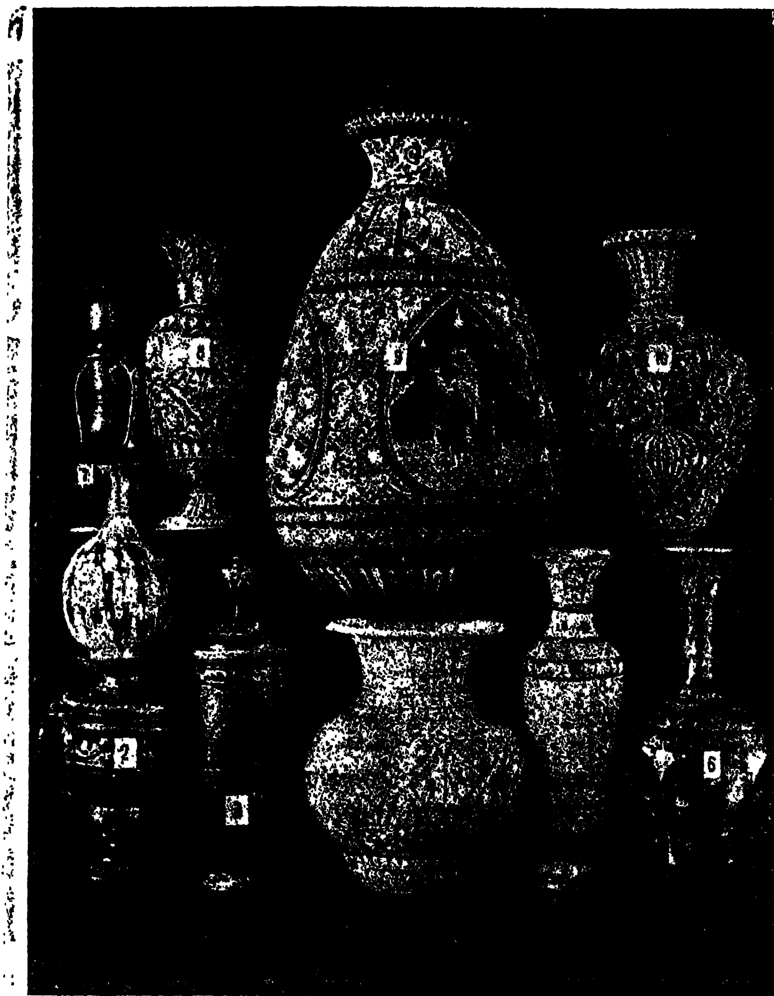
GLAZED POTTERY.

Glazed pottery of India, of which Peshawar, Lahore, Multan, Delhi, Jaipur, Ajmeer, Halla, Jubbulpur, Allahabad, Mirzapore, Raniganj, Vellore and Malabar, are some of the noted places of manufacture, had a peculiarity of choice of colour and designs of their own but owing to on slaught of unrestricted foreign competitions the art is detoriorating. The prevalent from now is green and pink on a milky white but in the earlier work the patches of colour were assorted so as to give, at a distance, the effect of bunches of flower. Of the Peshawar potteries of this class the glazing seems, however, to have improved and the pottery has come much more largely into competition with the imported Russian, Chinese, Duch and English for which there is a large local demand. "Pottery," remarked Sir George Watt, "is so extensively used in Peshawar that it would seem desirable every effort should be made to educate the local potters in the higher flights of their craft with a view to checking the imports. It has been pointed out that one of the chief difficulties in this direction is the restrictions imposed on the sale of lead by the local authorities."

The artistic pottery of Halla Multan, Sind originated with the production of tiles and for centuries lived through the demand for such goods. Some few years the potters

of Multan, doubtlessly dictated by the vicissitude of trade, decided to imitate the greens, yellows and browns as well as the blue, on a blue background with disastrous result. The depths of blues and whites of

The Pottery of Delhi is not made clay but of ground plaster mixed with gum or starch. It cannot in consequence be made on the potter's wheel but has to be moulded or wielded by the hand. The art



The figures represent potteries of 1.—Peshawar. 2 & 3.—Vellore. 4.—Delhi and Jaipur 5.—Multan 6 & 7—Sind. 8.—Bulandshahr. 9—Bombay. 10:—Rampur. We are indebted for the plate to the excellent work of Sir George Watt on Indian Art.

Multan which was the glory of the evolutions of centuries of patient study and discovery, has been effaced and the work of to day is slowly and dull.

originated apparently in Delhi, and one of the Delhi artists imported it to Jaipur where he was induced to join the School of Arts.

Now to turn to Plaster of Paris and Cement work. Many a place in India is famous for its marble like cement work. "This is made', we read in an authoritative book, 'with lime mixed with sand and either Plaster of Paris or powdered marble and very often sugar or some glutinous substance such as the gum from the *bel* fruit, when patiently beaten and smoothed almost until quite set, it assumes a remarkably hard consistence and an exceedingly fine polish. and when quite dry is usually most elaborately painted and gilded In India we have gypsum in abundance, yet except as an ingredient of certain cements plaster of Paris does not appear to have been ever used by our countrymen as a moulding material. Of pure Plaster of Paris work some admirable specimen are found in statue works of several Bombay sculptors and the photo representatives of the works of that famous Bombay sculptor Mr. G. K. Mahtre who has sent us a list of his works show this very admirably.

"From the report of the Geological Survey of India," pointed out a writer in *Capital*, "it appears that the suitable white clay for the manufacture of pottery can be extensively found in most of the Indian States. The Gwalior State has taken the foremost position in making experiments in pottery industry by employing the services of Mr D. C. Mozumdar, one of the Ceramic experts returned from Japan. Mr. Mozumdar has been successful in turning out decorated tiles out of Bela-clay, discovered in the state. The Baroda State also is rich in white clay for the manufacture of pottery. From the report of the mineral resources of the state it appears that Mr. V. S. S. Iyer has found out a very nice white clay, which exactly resembles Cornwall China Clay, near Ransipur, on the river Sabermati. The deposit is estimated at about 70,000 tons. From the analysis given by Mr. Iyer it shows that the best porcelain ware can be manufactured out of it. Other necessary raw materials, which will be required in the manufacture, can be found in the State. In the Kathiwar Provinces there are deposits of white clay just suitable for the manufacture of earthenware without mixing any other material to satisfy the composition. The best Raolin has been found out in the provinces of Cutch and Bhuj.

"I visited' the same writer continues, "the Ceramic Department of the School of Arts, Bombay. Mr. Firn, the head of the Ceramic Branch, took every pain to explain and show me the different sections of the department. The Pottery Section of the School of Art is at present intended for examining the various clays received from the different parts of India by analysing and making some experiments in India in the experimental oven The students there cannot get the opportunity of learning, the manufacturing and commercial knowledge of the subject

It has been suggested that there should be a class for the manufacture of pottery in all technical schools along with the modelling department with an experimental laboratory, the cost of which is given below :—

(Subject to alterations according to the circumstances.)

	Rs.
Analytical Laboratory fitted with necessary Chemical Instruments and balances	1,300
Experimental Muffle Furnaces	1,200
Apparatus for Physical analysis	1,000

Necessary Implements and Instruments for preparing Body and Glaze	500
Frit-Furnace	500
Laying out Gas, Erection and other expenses	500
Stock of materials for porcelain Body and Glaze	500
Washing apparatus	300
Three Potter's wheel	100
Requisites for the office	200
Total ...	6,100

MONTHLY EXPENSES.

	Rs.
1 Professor ...	250
1 Assistant ...	75
1 Foreman ...	25
1 Clerk ...	25
2 Workmen at Rs. 20 each ...	40
1 Peon ...	13
Office Expenses ...	15
House rent ...	50
Chemical expenses for 10 students ...	100
Gas expenses ...	50
Other miscellaneous expenses ...	40
Total ...	683

The manufacture of pottery should be taught in such a way that a student capable of investing four thousand and five hundred rupees, after graduating from the school, can start a business of his own. He will manufacture such articles for which he can get a very good sale in the local market. The cost of the plant for the manufacture of pottery with a capital of four thousand and five hundred rupees is given in the following estimate :—

ESTIMATE NO. 2.

Plants and Machinery :—	
Implements for grinding stone and clay according to country mothod	35
3 Settling tanks	250
20 Tubs	100
4 Potter's wheels	80
2 Lathes (wooden)	100
2 Kneading Boxes	75
2 Country sheds	1,000
1 Furnace (Bee-hive)	800
Other miscellaneous expenses	60
Total	2,500
Working capital	2,000

MONTHLY EXPENSES.

6 Workmen at Rs. 15	Rs. 90
Raw materials	Rs. 150
Fuel	Rs. 125
Other miscellaneous expenses	Rs. 75
Total	Rs. 440

MONTHLY PRODUCTIONS.

Daily output of 10 hours work will be 2 maunds, i. e , 160 lbs.

After deducting 10 per cent breakage it will be 144 lbs. The monthly output of 25 days of work will be 3,600 lbs. The selling price is taken as one anna and sixpies per lb. Then the monthly income would be total Rs. 562-8 0.

The monthly net profit will be (Rs. 562-8—Rs. 440) : Rs. 122-8.

The subject should receive most serious consideration of our Government and we hope the Government Department of Industry and Commerce will work to this.

The Art of Distillation & Essential Oils.

The art of distillation may be divided into 4 kinds : Simple, Dry, Destructive and Fractional. Simple distillation is the evaporation and subsequent condensation of the vapour of fluids, by means of a still and refrigerator or other similar apparatus. This form of distillation is familiar to us all : rain in Dame Nature's own distilled water. Dry distillation is a term applied to the distillation of substances *per se*, or without the addition of water or other volatile fluid. Destructive distillation is the distillation of substances at temperatures sufficiently high to decompose them, by which their elements are separated, or evolved in new combinations. Fractional distillation is the separation of substances having different boiling points, by distilling the mixture with a gradually increasing heat and collecting the products which come over at different temperatures in separate receivers. We shall deal with the first or simple kind of distillation in this article.

The art of distillation is a very ancient one. We find mention of it in the Rig-Veda and in the works of ancient alchemists who tried in vain to discover the *Elixir of life*. Many critics may assert that the modern form of distillation was unknown to the ancient Aryans. This is not so. Their method of preparing the "*Soma* wine" will convince any one that the ancients knew the art and practised it to a high state of perfection. The still used for preparing the Soma wine was known "*Drona Kalas.*" The late Dr. Rajendra Lall Mitter, in his *Silpik Darsan*, describes it "as a wooden still capable of holding 128 seers of liquid. These stills were made of the wood of the catechu or other trees." Our illustrious countryman, Dr. P. C. Roy, has conclusively proved, in his monumental work, "History of Hindu Chemistry,' that the ancients knew and practised the art even in the Vedic period.

This art has a wide range of industrial applications. It is resorted to in the preparation of ottos and essential oils, wines and spirits, simple medicated and perfumed waters, in the preparation of pharmaceutical extracts, tinctures, in the refining of camphor and mercury and in various other chemical and technical operations. All these various operations require special kinds of still in each case. But, all ordinary distilling apparatus consists of 2 parts—one in which the heat is applied to the body to be distilled and vaporised (called the "still"), and the other into which the vapours that are formed enter in order to undergo the cooling that condenses them (termed the "condenser.") We shall treat here about the distillation of essential oils and ottos only.

But before proceeding further, let us see what are their properties. The volatile or essential oils are usually more limpid and less unctuous than the fixed oils ; but some of them are butyraceous or crystalline. Nearly all of them consist of two or more oils, differing in their specific gravity and boiling points, one of which is generally liquid, the other, in some cases, crystalline. All of them, when perfectly pure, are colourless, though before rectification nearly the whole of them have a pale yellow tint, and some of them are brown, blue, or green. Their odour is that of the plants, etc, which yield them, and is usually powerful ; their taste is pungent and burning. They mix in all proportions with the fixed oils, dissolve freely in both alcohol and ether, and are

sparingly soluble in water, forming perfumed or medicated waters. Their boiling point usually ranges between 340° and 660°F., and is always considerably higher than that of water. They resist saponification, and (excepting oil of cloves) do not combine with the salifiable bases. Their density fluctuates a little on either side of water. The lightest oil is that of citrons (sp. gr 0.847), and the heaviest that of sassafras (sp. gr. 1·142.) When cooled sufficiently, they all solidify. The common temperature of the atmosphere is sufficient for this with some of them, as the oils of roses and aniseed; whilst others require to be cooled below the freezing point of water before they solidify. In the solid state they appear to consist of a crystalline or semi-crystalline substance (stearoptene, stear-essence), and a fluid portion (Eleoptene, oleiessence). The two may be separated by pressing the concrete oil between the folds of bibulous paper, in the cold. By exposure to the air, the essential oils rapidly absorb oxygen, and become partially converted into resin. This is the cause of deposit that usually forms on them (especially in the expressed oil of orange) when kept in an ill-corked vessel. The solid crystalline matter which separates from them when in closed vessels is stearoptene.

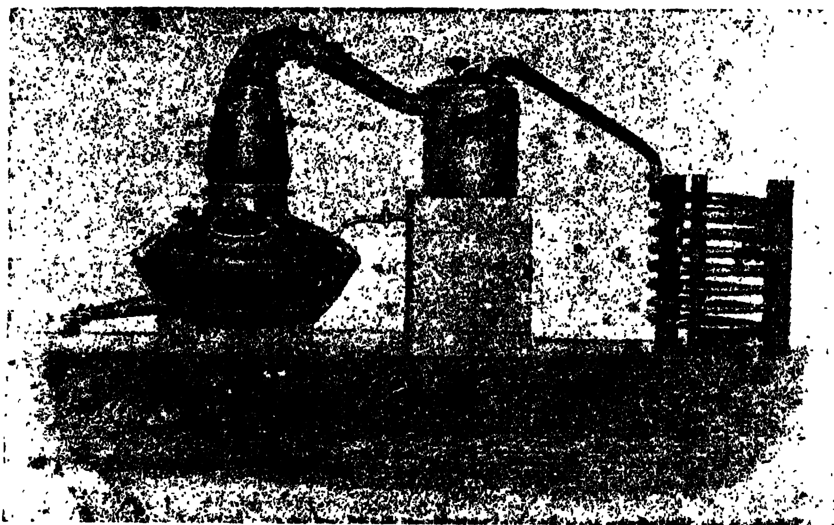
Chemically speaking, the essential oils may be divided into 4 great classes: (1) alcohols; (2) esters; (3) aldehydes; and (4) compounds not included in those groups. For the sake of our more "non-chemist" readers we may classify them in o 3 classes, thus:—(1) oils composed of carbon and hydrogen only (Binary Volatile oils, carbo-hydrogens, Hydro-Carbons, Terbenes, Camphenes), of which oil of turpenture may be regarded as the type. These are characterised by being, as a class, less soluble in rectified spirit and in water than the other essential oils. The oils of bergamot, capivi, cubebs, elemi, hops, juniper, lemons, orange-peel, pepper, lemon grass oil, laurel oil and some others, belong to this class. (2) Oils containing carbon, hydrogen and oxygen (oxygenated oils), including most of those used in medicine and perfumery. These, as a class, are more soluble in rectified spirit and in water than those containing carbon and hydrogen only. To this class belong the oils of almonds, cassie, aniseed, cedar-wood, cinnamon, cumin, Jasmin, lavender, meadow sweet, orange flower, penny-royal, peppermit, spearmint, rosemary, roses valerian, winter-green and others too numerous to mention A few of these oxygenated oils contain nitrogen. (3) Oils containing sulphur (sulphuretted oils). These are characterised by their extreme pungency, suffocating odour, vesicating power, property of blackening silver, and being decomposed by contact with most other metallic bodies. The oils of asafœtida, garlic, black mustard seed, horseradish, and onions are of this kind. Some sulphuretted oils also contain nitrogen.

The essential oils are generally procured by distilling the odouriferous substances along with water; but in a few instances they are obtained by the processes of maceration, expression and enfleurage, and still more rarely by the action of alcohol or other solvents.

According to the common method of proceeding, substances which part freely with their oil are put into the still along with about an equal weight of water, and are at once submitted to distillation. Those substances which give out their oil with difficulty are first soaked for 24 hours, or longer, in

about twice their weight of water, to each gallon of which one pound of common salt or chloride of calcium has been added, in order to raise its boiling point. The distillation is conducted as quickly as possible, and when one half the water has come over, it is returned into the still, and this cohobation is repeated, when necessary, until the distilled water ceases to be mixed with oil. The heat of steam or a salt water bath should be preferably employed. When a naked fire is used, the still should be deep and narrow, by which means the bottom will be better protected by the gradually decreasing quan-

about 55° F. The mixed vapours which pass over condense and fall as a milky loo ing liquid into the receiver. This separates after a time into two portions, one of which is a solution of a part of the newly eliminated oil in water, and the other is the oil itself. The latter either occupies the upper or the lower portion of the receiver, according as its specific gravity is less or greater than that of distilled water. The separation of the oil and water is effected by means of a syphon or a glass separator with a stopcock at the bottom. The annexed diagrams will give a clear idea of the arrangements The figure shows



tity of water towards the end of the process, and empyreuma prevented. When the distilled water is to be repeatedly cohobated on the ingredients a convenient and economical plan is to so arrange the apparatus that after the water has separated from the oil in the receiver, it shall flow blac again into the still. An ordinary worm-tub, or other like condensing apparatus, may be employed ; but in the case of those oils which readily solidify, the temperature of the water in the condenser must not fall below

a copper still for direct firing with retort and condensing coil. Messers Blair, Camp ell and Mc'ean, Ltd., Woodville St., Govan, Glasgow, Scotland, have kindly permitted us to use the above diagrams for our journal. They can supply all those stills, besides others, of which they are the world renowned makers. Prices and estimated can be had on application from them. In our next we shall publish illustrations of other stills for the extraction of essential oils.

(To be Continued.)

Skin Foods

Many substances are used as bases for skin foods, but lard or suet, in some form or other, cod liver oil, and casein are used extensively. These articles have a large sale now-a-days and any one can make money out of them Here are a few of the selected recipes.

(1) Purified lard, 16 ozs ; suet, 16 ozs. ; olive oil, 3 ozs.; compound tincture of benzoin, 8 drs. Melt together the lard, suet and oil, and as they cool, stir in the tincture.

(2) Rough skin is to be washed constantly in vichy water. Besides this, rough places are to have the following applications, twice daily, either a few drops of—(a) Rose water, 400 parts ; tannin, 3 parts ; glycerine, 100 parts Mix. (b) Orange flower water, 400 parts ; glycerine, 40 parts. Borax, 8 Mix.

(3) White petrolatum, 28 ozs. ; paraffine wax, 2 ozs.; lanolin, 8 ozs.; borax, 2 drs.; rose water, 12 ozs ; melt the wax, add the petrolatum and lanolin, pour into a warm mortar, and, with constant stirring, mix the rosewater in which the borax has been previously dissolved. This compound may be tinted red by means of alkanet root suspended in the melted mixture, ere the water is added.

(4) Castor oil, 12 ozs ; alcohol 20 ozs ; oil of lavender, 2 drs ; oil bergamot, 1 dr. Mix. This can be tinted by carmine.

CASEIN.—To prepare casein extemporaneously, for use as a skin food, place the skimmed milk in a shallow dish, set aside in a warm place until it coagulates, then heat to 120°, and strain the whey, wash with cold water, and press as dry as possible. To prepare it even more quickly, precipitate it from milk with acetic acid or vinegar, and, after heating, proceed as above explained.

SNOW CREAM.—Spermacéti, 9 ozs.; white wax, 6 ozs.; fresh oil of almonds, 36 ozs,: melt over a waterbath ; pour in a marble mortar, and stir briskly to prevent granulation. When the mixture becomes of the consistence of butter, triturate until it has a white, creamy appearance ; add gradually a mixture of finest rose water, 3 ozs ; odourless glycerine, 3 ozs Mix for half an hour, then add 15 drops of essence of roses ; beat for about 45 minutes.

TOILET CREAM. – Quince seed, 360 grs.: boric acid, 40 grs.; glycerine, 10 ozs.: alcohol, 10 ozs ; carbolic acid, 2 drs.; oil of bitter almond, 30 drops ; glycerite starch, 10 ozs,: tincture of benzoin, 60 minims, almonds, 6 ozs.; distilled water, enough to make 90 ozs. Blanch the almonds, and beat to a pulp, with about 35 to 40 ozs of water; macerate the quince seed in water for several hours, strain, and mix with the starch and glycerine in which the boric and carbolic acids have been dissolved : add the tincture of benzoin, drop by drop, to about 2 pints of water, and add to above ; dissolve the oil of almond in the alcohol, and mix all thoroughly ; strain through muslin and add the remainder of the water.

WITCH HAZEL SNOW.—This famous preparation is sold under the name of Hazeline snow Its composition is a secret and has never been divulged. But the following is a close resemblance to the article. Stearic acid, 120 grams ; sodium carbonate, 18 grams ; glycerine, 14 grams ; hamamelis water, 600 grams ; water, enough. Melt the stearic acid in a tared vessel of about 4,000 c. c. capacity, over a water bath, and add

the sodium carbonate, dissolved in a minimum amount of hot water: then add the glycerine. Keep the mixture on the water bath for one hour, stirring constantly, but not vigorously; add sufficient water to bring the preparation up to 600 grams, and then the hamamelis water. Return the container to the water bath for 3 or 4 minutes, stirring the mixture until perfectly smooth. Pour into a warm mortar, and beat to a foam. Let it stand for a day, stir with a spatula, and fill into wide mouthed bottles. This is one of the most beautiful of skin foods.

Lavender.

Lavender is one of the plants of the genus of herbs or shrubs belonging to the natural order Labiatæ, which comprises some 20 species, mostly Mediterranean. Of these, two—L. Gibsoni, *Grah* and L. Burmanni, *Benth.*, are natives of India. Neither of these is known to be of economic value, but Lisboa, in his *Useful Plants*, has affirmed that the latter, a highly aromatic species, might be utilised in the manufacture of oil of Lavender, a substance at present entirely imported from Europe.

The oil, as commonly sold, is the produce of *Lavandula vera*, *Dc.* It is a native of Southern Europe and the Mediterranean shores, extending into Western Africa; introduced into England, where it is now extensively cultivated for the spikes flowers from which the essential oil or otto is distilled. The cultivation of lavender does not appear to have been attempted in India except to a small extent in the Nilgiri Botanic Gardens, but there seems to be no reason why it should not do well on the Himalayas. There occurs in commerce a kind of oil of lavender known under the name of oil of aspic, or oil of spike, extracted by distillation from a wild variety of *Lavandula spica* which has large leaves, and is therefore called *latifolia*. This lavender oil is manufactured on a large scale in the South of Europe. Its odour is less characteristic than that of the lavender, resembling somewhat that of oil of turpentine, with which it is indeed often adulterated It is also so cheap, as to be sometimes used instead of the latter oil.

The true oil is distilled from the herb, which is pale lemon yellow, highly fragrant, and with a bitter, warm, aromatic taste. The characteristic properties of the plant have been developed to an enormous extent by English cultivation and soil. But they are not equally developed, for, indeed, there are only two districts that can be said to suit the plant: These are Mitcham in Surrey and Hitchin in Hertfordshire In the latter locality over 50 acres are annually under cultivation. The plant may be propagated by cuttings. The bushes are grown in rows 4 feet apart, the plants being 3 feet removed from each other; an acre so planted contains about 3,547 bushes. When about four years old they yield the best otto, and are improved by keeping back the flowering. An acre should yield about six to seven quarts of otto, or 1½ to 2, early, in other words, 112 lbs of flowers yield 30 to 32 ozs. The whole of the flowering herb is commonly distilled. According to Raybaud, the herb, after flowering (Sept.), yields the most oil.

Its Chemistry.

Its sp. gr is 0.8903 at the temp. of 72 F. and 0.877 when it has been rectified. According to Brande, the sp. gr. of the

oil obtained from the flowers only is 0.8960; that from the whole plant, 0.9206. The lightest is esteemed the best This for this reason that Mitcham oil of Lavender is the most superior in the world It is soluble in all proportions in alcohol of 0 830 but alcohol of 0 887 dissolves only 42 % of its weight. It deposits when partially exposed to the air, a concrete oil, which resembles camphor, to the amount of ¼ of its weight. Chemically speaking it contains (1) linalool acetate (also found in oil of bargamot); (2) linalool, which is an alcohol and an oxidation product of the terpene, myrcene: it is isomeric with borneol, geraniol and menthol; and (3) cineol.

PURITY AND TESTS.

Alcohol is the substance commonly used to adulterate this oil; but, occasionally, oil of bergamot is used for the same purpose. If the density is below 0.87, there is reason to suspect adulteration. Its power of turning the plane of polarization, given for a glass column 10 inches long, is—20° When pure—(1) sulphuric acid turns it reddish brown, and the reaction is accompanied by strong inspissation. (2) It fulminates quickly and violently with iodine, with the production of a yellow cloud, and the thick syrupy residue possesses a pungent, acid, balsamic odour. The oils of the other allied plants fulminates much less powerfully with iodine. The presence of alcohol weakens, but does not destroy, the action of this test, unless it is added in an equal volume, when only a lively effervescence and a disengagement of orange coloured vapours are produced by the iodine, without fulmination. (3) Santaline is nearly insoluble in pure oil of lavender, and exerts no marked action on it, but is freely soluble in oil of lavender adulterated with alcohol or rectified spirits.

PREPARATIONS.

In the pharmacopœia of India three preparations are described as officinal—an oil, a spirit, and a compound tincture. Of this the oil is rarely administered internally in its simple form, and is employed almost entirely for disguising the unpleasant odour of ointments and other preparations. The spirit and tincture (diluted preparations of the oil) are stimulant, carminative and antispasmodic and are considerably used in nervous and hysterical cases, incipient syncope, flatulence, and flatulent colic The dose of the oil is ½ to 3 minims, of the spirit 5 to 20 minims, and of the compound tincture, 30 minims to one drachm.

SPIRIT LAVENDER.

Oil Lavender	1 oz
90 p. c alcohol	9 ozs. mix

Tinct. Lavand. Comp.

Cinamon, 75 grs.; nutmeg, 75 grs.; Red Sanders wood, 150 grs.; 90 p. c. alcohol, 1 pint. Macerate for a week and filter. Then add oil of lavender, 45 minims and oil of rosemary, 5 mins.

However, the fragrant oil is largely used in perfumery. Indeed, lavender water is the most favourite of all the essences. The oil also enters into many compound perfumes. Here are a few of the recipes out of many hundreds. Every manufacturer has his own formula. To produce a highclass lavender water, don't use oil of bergamot. It must be remembered also that lavender water improves with age.

1. Dr Piesse, in his Art of Perfumery, says that the "essence of lavender is best

prepared by distilling a mixture of oil of lavender with rectified spirit, in the proportion of 4 ozs. of the forer to 5 pints of the latter (60° over proof), with one pint rose water."

2. Mr Brande gives the following formula :—Rectified spirit, 5 gallons ; oil of lavender, 20 ozs.; oil of bergamot, 5 ozs.; essence of ambergris, 4 drs. Sometimes 4 ozs. of orrisroot are digested with the above.

3. The celebrated Dr. Pereira's recipe was: Oils of lavender and bergamot, of each, 3 drs.; otto of roses and oil of cloves, of each, 6 minims ; musk, 10 grs.; true oil of rosemary, 1 dr.; honey, 1 oz.; Benzoic acid, 40 grs.; rectified spirit 1 pint ; distilled water, 3 ozs.

4. Cooley gives the following recipe : Mitcham oil of lavender, 8 ozs ; essence of Musk, 4 ozs.; essence of ambergris and oil of bergamot, of each, 1½ oz ; rectified spirit, 2 gallons ; mix well. Very fine.

5. Eau de Lavande de Millefleurs, To each quart of the above add oil of cloves, 1½ dr. and essence of ambergris, ½ dr.

6. Oil of Lavender, 2 ozs.; essence of ambergris 1 oz ; Eau de Cologne 1 pint ; Rectified spirit, 1 quart. Mix.

7. Mitcham oil of lavender, 1 oz.; strongest rectified spirit, ½ pint. Mix with agitation. A few drops of essences of musk and ambergris may be added at will.

8. Extract.—Mitcham oil of lavender, 4 drs.; essence of rose, 2 ozs. ; deodorized alcohol, 14 ozs. Mix.

New Process of Brick-Making.

The art of brick-making like almost every other branch of industry has made very little progress in our country. Just like the potter's wheel, the method of manufacturing bricks is still in its crude and infant stage.

It is a pity that the same old method of brick manufacture with hand moulds and hand labour is still followed here with very little improvement. Our method is still dependent on the vagaries of the season. During the rainy season the brick making industry is practically at a stand-still, and construction work undertaken either by the Government or by private parties suffer considerabley. In the United States of America, where winter in most places lasts for practically seven months in the year and there is a continuous snowfall with a temperature below the freezing point,the American people manage to manufacture bricks all the year round. This is possible because of their improved machinery and their seientific method of drying and burning.

The aim of the present article is just to give in brief the American methods of brick manufacture, and compare the cost of production in American ways with those pursued in our country. In a future issue I may if the business public are interested, describe briefly method of pottery and porcelain, tile and enamel manufacture. I will now confine to ordinary brick manufacture.

The manufacture of bricks consists of the following steps:—

1. Preparation of clay,
2. Moulding.
3 Drying.
4 Burning.

Surface clay and alluvial deposits* (or silt from the river Hoogly which is very generally used for making bricks which are sold in the Calcutta market) are very generally used for brick manufacture. They do not require any disintegrators or crushers, a pugmill being often quite sufficient for their preparation.

In the United States there are two distinct processes of making bricks :--

1. Wet process, with (a) Soft mud, (b) Stiff mud.

2. Dry process with clay powder. This is what they call in America pressed brick.

1. Wet process (a) with soft mud. :—

In this method clay and sand are mixed with water to the consistency of a soft mud or paste and pressed into moulds. Soft mud bricks are either moulded by hand or machine. In our country hand-moulding method is the only one used. In this method the daily out-turn is very limited. In America handmoulds have been replaced by machine-moulds, still the out-turn is not large.

There the soft mud process is gradually dying out, giving place to what they call the "stiff mud" process. The only advantage claimed for the "soft-mud" process is that it is adaptable to a wider range of clays than any of the other.

(b) Stiff-mud process :—

This method can be used with most advantage in a brick factory having an output of 50,000—80,000 bricks per machine per day of 10 hours. In this process the clay is tempered with very little water and consequently is quite stiff. The principle of the process consists in forcing the prepared clay through a rectangular mould. As the bar of clay issues from the machine, it is received on the cutting table, where it is cut up into bricks automatically with a wire cutter. The most generally used form of the "stiff-mud' machine, is known as the "auger" machine. It is a cylinder closed at one end, and tapering off at the other end into a rectangular mould whose cross section is either one end or the largest side of a brick. Within this cylinder, which is set in a horizontal position, there is a shaft carrying blades similar to those of a pug mill. At the end of a shaft nearest to the mould there is a tapering screw. The mould is heated by steam or lubricated by oil on its inner side, in order to facilitate the flow of clay through it. Tempered clay charged into the cylinder at the end farthest from the mould is mixed up by the revolving blades and at the same time moved forward until seized by the screw is pushed through the mould. Since this involves considerable power, it results in a marked compression of the clay.

This "stiff mud" auger machine is very much used in England and America. It is probably used more extensively than either the "soft-mud" or "dry-press" machine. It has a very large capacity, and a medium sized machine can produce from 60 000—80,000 bricks in a day of ten hours, and large machine 100,000—120,000 requiring 75 120 H. P.

2 Dry or Dry pressed process:—

Clay in the from of powder is used in this method. Clay powder is pressed into steel moulds in a dry or nearly dry condition, The initial preparation is a little more elaborate than that in the process just described. It has to be weathered and very well pulverised. The bricks do not require any drying. But one drawback is its small daily out-turn. Its

capacity is limited to 15,000—30,000 bricks per machine per day of ten hours, consuming only 25-30 H.P. However, there is a considerable saving in power consumption. In this process the bricks are very sharp-edged and smooth. When hard burned they are as good as others.

Drying:—

Bricks manufactured either by the "dry-press" or the "stiff mud' process require very little initial drying, if they are burned in continuous kilns. Because in these kilns, while bricks burn in one chamber, the waste hot gases conducted through other chambers full of bricks, drive off the moisture contained in them.

Continuous Kiln:—

It consists of a series of chambers arranged in a circle and connected with each other and also with a central stack by means of flues. Each chamber can contain about 22,000 bricks. In starting the kiln, a chamber full of bricks is first fired by means of fireboxes placed outside and the initial smoke and vapour that come off are conducted to the central stack. But as soon as they cease, the heat or hot gases from the chamber first fired is conducted through several others ahead of it, before it is finally let out on the stack, and these hot gases are only let out just a little before actual deposition of moisture takes place. In this way the waste heat from any one chamber is used to dry the contents of the others. Thus, while the bricks in one chamber are burning, those in two or three chambers ahead of it are being half-burned and dried. As soon as one chamber reaches its maximum temperature the next two or three ahead of it are heated-up while those behind it cool down. A wave of maximum temperature may be said to pass round the kiln. It is thus possible to be burning bricks in certain compartments, filling others, and emptying still others, all at the same time making the process a continuous one.

The advantages to be derived from the erection of a "stiff-mud" brick plant are as follows:—

1. Superior quality of bricks:— All bricks will be well shaped, solid, compressed and thoroughly burnt; the chances of underburning are almost nil The polish and finish are decidedly superior In fact even the second class bricks made by this method would compare very favourably with the first class ' hand manufactured" bricks.

2. Drying is practically done away with in this system.

3. Fuel economy:—In this process there is a considerable economy in fuel consumption, which is quite evident from the way in which the hot gases are utilised in the other chambers in drying the bricks.

4. Saving in labour:— The number of men required would be just about one tenth of the number required in an ordinary brick field where the daily output is much less

5. Cheaper cost of production: The economy of fuel and labour thus secured would reduce the cost of manufacture considerably. The cost would not exceed Rs. 6. per thousand, in a brick field near about Calcutta. In such places as New Delhi, the cost of coal being greater Rs. 7 or 7-8 would be required.

6. Continuous Supply all the year round is secured.

N. N. DUTT M. Sc., C. E,

—selected.

Small Trades & Recipes.

What do you do with rotten betelnuts and broken cocoanut shells? Certainly you throw them away, never thinking that a lot of money can be made out of them. You may ask, how? Well, burn or char them thoroughly in well closed vessels. These will become charcoal, which can be utilised in many ways as you like. But if you grind them, then pass a sieve or cloth and perfume it with any otto, you shall have one of the best tooth powders known to medical science.

Another thing, with which you become disgusted, is the soot from lamps Why not make fertiliser out of them for your plants! Certainly it does not cost you any-thing. Twelve qts. of soot dissolved in one hhd. of water will make a good liquid manure, which can be applied to the roots of plants with great advantage.

BLUE PENCIL FOR SKETCHING ON GLASS.

Take Prussian blue, 30 parts; powdered gum arabic, 10 parts and tallow, 20 parts; melt the tallow and mix in the pigments in a mortar. Then allow the mass to cool and transfer it to the presses. In these the mass is treated and shaped similarly as the graphite in the presses for ordinary lead pencils.

ARTIFICIAL ESSENCE OF GRAPE.

Glycerine	20 parts
Chloroform	4 „
Aldehyde	2 „
Formiate of Ethyl	4 „
Enanthylate „	20 „
Salicylate of Methyl	2 „
Tartaric acid soln	10 „
Succinic „ ,	6 „
Absolute alcohol	200 „

Mix This can be used for syrups, for flavouring, etc., like the genuine essence. The solutions of tartaric and succinic acids should be cold saturated alcoholic solutions.

CEMENT FOR LEAKY ROOFS.

Rosin	4 lbs.
Linseed oil	1 pint
Red lead	2 ozs.

Stir in fine sand until the proper consistency is obtained and apply warm. This cement becomes hard, and yet possesses considerable elasticity, is durable and water-proof.

"SYNDETICON"
(Liquid Fish Glue.)

Fish glue, 100 parts; acetic acid, 125 parts; gelatine, 20 parts; water, 125 parts; shellac varnish, 20 parts. Dissolve the fish glue in the acid, the gelatine in the water, mix the solutions, and gradually incorporate the varnish.

POLISHIG RAG.

Marseilles soap	4 grams
Water	20 „
Dissolve and add Tripoli	2 „

Saturate a piece a cloth 70 cm. long and 10 cm. wide with it, and allow to dry. It may be coloured with a little coralline. This rag is used for polishing articles of metal, etc.

CRACKING COAL FOR CUTTING GLASS.

Powdered charcoal, 90 parts; nitre, 2 parts; benzoin, one part; powdered tragacanth, 2 parts. Mix with a little water, roll into pencils, and dry. Let one of these, when ignited, pass slowly over the glass, and cause a drop of water to fall in the hot parts, when it cracks. The crack may be led in any desired direction by means of the turning pencil.

FOOD FOR RED BIRDS.

Snuflower seed	8 ozs.
Hemp seed	16 "
Canary "	10 "
Cracked wheat	8 "
Unshelled rice	6 "

Mix, and grind to a coarse powder.

Reference Directory.

American Type-writers.

1. American Typewriter Co., 265, Broadway, New York City, manufacturers of the Young Am. $7 Typewriter and the Am. $50 Typewriter. (2) Elliott-Fisher Co., Harrisburg, Penn. (3) Fox Typewriter Co., Grand Rapids, Michigan. (4) L C. Smith & Bros. Typewriter Co., Syracuse, N. Y. (5) Union Typewriter Co, 293, Broadway, New York City. All of U. S. A.

Hosiery Manufacturers.

1 Bengal Hosiery Co Ltd., 63, Ezra St. 2 Calcutta Hosiery Co., 17, Gobind Chand Dhurs Lane. Both of Calcutta. 3 Morarjee Goculdas & Co., Tamarind Lane, Fort, Bombay. 4 Abdul Razak, Makhania Bazar, Cawnpore. 5 The Aryan Hosiery Factory, Bangalore. 6 Basel Mission Weaving Establishment, Calicut, Malabar. 7 The Behar Knitting Factory, Mogalpura Street, Patna City. 8 Cocker & Co., Peshwar, Rawalpindi, Muree & Srinagar. 9 Swadhesi Bhandar Co., Lohari Gate Street, Lahore. 10 Tezpur Hosiry Co, Tezpur, Darrang, Assam.

Photo Process Engravers.

1 The Acme Printing and Process works, 115, Ahmerst St, 2 The Johnston Engraving Co., Br. Indian St. 3 Calcutta Phototype Co., 1, Crooked Lane. 4 Hopsing & Co., Chowringhee Road. 5 Lewis & Co., Govt. Place, East. 6 K. P. Mookherji & Co, Mangoe Lane. 7 P Sett & Co., Bentick St. 8 Thacker, Spink & Co., Govt Place, North. All of Calcutta. 9 Am Process Studio, Stringers St, George Town. 20 Methodist Publishing House, Mount Road. Both of Madras 11 James Clifford & Co., Dulal St., Share Bazar. 12 Times Press, Times Bldgs., Hornby Rd., Fort, both of Bombay. 13 Royal Printing Press, Banks Road, Lucknow. 24 S Shalom & Bros., Nagpur. 15 Wiell & Klein, Ooty, Nilgiris. 16 Dey & David, Dalhousie Street, Rangoon. 17 F. Skeen & Co., Chatham Street, Colombo.

Bone Crushing Machinery.

Max Frederich & Co., Leipzig, Plaguzity, 32, Germany.

Pencil making: Machinery.

1. Gorg. Mussmann (Ink-Ludurg Pittroff.), Bareuschanz Street, 115, Nurnberg. 2. Pemsel Fiedr., Obere Kanal St., 12, Nurnberg. Both of Germany.

Umbrella Materials.

Cloth.—1. Gerhartz & Co., 38, Chapel Street, Bradford. 2. C. David Miller & Co., 27, King Street, Cheapside, London, E. C.

Nussbaun Julius, 11 & 12 Bridgewater St., London, E. C. All of England.

Frames.—1. William Fox & Co., Lime Foub Baratau 49, Amiens, France. 2. Banermann and Sohne, Hilden, Rhineland, Germany.

Handles.—Nack Richard, Hidden, Rhineland, Germany. Accessories —1. Fox Samuel & Co., Lim. 8, New Union Street, London, E. C. 2. E. Newman & Co., 1 & 3, Leonard St., Finsbury, London, E. C.

Capsule Making Machinery.

1. The Liverpool Press & Tool Co., Bridgewater Street, Liverpool. 2 . Melin & Co., 37, Crutched Friars, London. 3. Kaufmann and Sohn, Bamberg Germany.

Pin making Machinery.

1 H. G. Barr, Worcester, Mass, U S A. 2 F. B. Shuster & Go. New Haven, Conn., U. S. A. 3 Alfred H. Schutte, Cologue-on-Rhine, Germany.

Reference Catalogue of of Books, Etc.

Books on Ice Making.

(1) The Mechanical Production of cold, by J. A. Ewing, Rs. 7-8. (2) Modern Refrigerating machinery, by Prof. Hans Lorenz, Rs. 16. (3) Theoretical and Practical Ammonia Refrigeration, by I. I. Redwood, Rs. 4. (4) Principles and Practice of Artificial Ice Making and Refrigeration, Rs. 12-4, by L. M. Schmidt. (5) Compend of Mechanical Refrigeration and Engineering, by J. E. Siebel, Rs. 14. (6) Refrigeration, Cold storage and Ice making, by A J. Wallis-Tayler, Rs. 9-3. (7) Mechanical Refrigeration, by H. Williams, Rs. 7-14. (8) Refrigeration, by J. W. Anderson, Rs. 6-9. (9) Practical Cold storage, by M. Cooper, Rs. 13 2. (10) Refrigerating machinery and its management, bp H. R. Leaske, Rs. 4-6. (11) Machinery for Refrigeration, by N. Selfe, Rs. 15-5.

Books & Journals on Wood Distillation.

(1) Wood Products, by P. Dumesney, Rs. 9-3, (2) Destructive Distillation, by E. J, Mills. See also articles on the subject by the following experts in the Journal of the Society of Chemical Industries:—1892, 395 & 872, by John Chorley and Wm. Ramsay. 1897, 667 & 722, by M. Klar.

Journals on Gardening & Horticultnre.

(1) Amateur Gardening, weekly. Annual subscription with postage. Rs. 7-8 (2) Fruit Grower, W.A.S., Rs.6. (3) Garden Life. W. A. S., Rs. 7-8. (4) Gardener's Chronicile. W. A. S, Rs, 14-4. (5) Journal of Horticulture W. A. S., Rs. 10-12. (6) Orchid Review. Monthly, A. S., Rs. 6-4. The above journals can be had from Messers Thacker, Spink & Co. of Calcutta

Books on Book Binding.

(1) Practical Bookbinding, by H. Adams, Rs. 4-6. (2) A History of the Art of Bookbinding, by W. S. Brassington, Rs. 9. (3) Persian and Indian Bookbinding, by T. H. Hendley, Rs 6. (4) Modern Bookbinding, by S. T. Prideaux, Rs. 9-3. (5) The Art of Bookbinding, by J. W. Zachusdorf, Rs. 10. (6) Bookbinding and the care of Books, by Cockerell, Rs. 4-6. (7) Bookbinding for Amateurs, by Crane. Re. 1-14

(8) Practical Bookbinding, by Pearce, As. 14.

Books and Journals on Boot and Shoe making.

(1) Boot making and mending by Hasluck, As. 14. (2) The Art of Boot and Shoe making, by J. B. Leno Re. 1-8. (3) Manufacture of Boots and Shoes, by F. Y. Golding, Rs. 6-9. (4) Boot and Shoe Trades Journal, weekly, Annual subscription with postage, Rs. 11. (5) British shoemaker, quarterly, A. S., Rs. 2 8. (6) Shoe and Leather Trader, monthly A S, Rs. 5 4. (7) Shoe manufacturer's monthly, A. S., Rs. 2.

Books on Colour Manufacture.

(1) Oil, colours and Printer's Inks, by Andes, Rs. 4 6. (2) The Lead and Zinc Pigments, by Holley, Rs. 10-15 (3) Recipes for the Colour, Paint, Varnish, Oil, Soap, and Drysaltery Trades, Rs. 6-9. (4) A Treatise on colour manufacture, by Dr. C. Mayer, Rs. 26 14 (5) The Manual of colours and dye wares, by Scherer, Rs. 5-10. (6) Pigments, Paint and Painting, by Terry, Rs. 5 10. (7) Oil and colour Trades' Journal, weekly, Annual subscription with postage, Rs. 15.

Journals on Paper Making.

(1) Paper maker and Br. Paper Trade Journal, monthly, A S., Rs. 12. (2) Paper making, M. A. S., Rs. 4-4. (3) Paper Trade Review, weekly., A S., Rs. 26. (4) Paper maker's monthly Journal, A S., Rs 8.

Scientific & Industrial Topics.

A Cure for Snake Bite.

Many vaunted remedies have been advertised, from time to time, for snakebites. Now, the following appears in the *Indian Agricultural World.* "A certain medical man has submitted the following prescription. It was discovered by a Negro slave, it is stated, and that, as a reward for his discovery, he was given his freedom and a pension for life:—Take of the roots of plantain or horehound (in summer, roots and branches together), a sufficient quantity; bruise them in a mortar and squeeze out the juice, of which give, as soon as possible, one large spoonful If the person is swelling, it must be forced down the throat. This generally will cure. If the patient finds no relief in an hour after, give another spoonful, which never fails If the roots are dried, they must be moistened with a little water. To the wound may be applied a leaf of good tobacco moistened with rum." The remedy is worth trial.

Madras Indigo

The total area sown with indigo in the Madras Presidency up to the end of November, 1913, is estimated at 56,500 acres, which is 15 p. c. less than the area sown in the corresponding period of 1912 and is also less than the average of 5 and 10 years by 40 p. c. and 54 p. c. respectively.

Rearing of Mulberry Silk Worms.

A recent Bulletin issued by the Agricultural Research Institute, Pusa, is entitled "Instructions for Rearing Mulberry Silkworms," by Mr. M. N. De, Sericulture Asstt. to the Imperial Entomologist. In a prefa-

tory note, M. A. J. Grove, the offg. Imperial Entomologist, says that the methods described in the Bulletin have all been thoroughly tested at Pusa, and considerable attention has been paid to the selection of varieties which will yield the best results, and particularly to the introduction of European univoltine races which are suitable to the plains of India It is believed that if rearers will start on the lines suggested in the Bulletin, a great improvement in quality and outturn will result

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Artificial Sponge.

A recent issue of the "*Scientific American* gives a very novel method of making artificial sponges from paper. Paper pulp is treated with zinc chloride to produce a viscous mass ; sodium chloride is then added, the mass thoroughly rinsed with alcohol, and finally submitted to the action of a press whose platform bristles with a number of fine metallic points or projections. These penetrate the mass, forming pores like those in an ordinary sponge. The block thus obtained is of spongy consistence and is both insoluble and unalterable in water. It is smooth and pleasant to the touch, and not liable to putrefaction.

To Drive away Ants.

Ants give us a great deal of trouble. Many methods have been tried and abandoned. Now, Messers W Newell and T. C. Barber give some account of investigations conducted by them on Argentine Ant, in the Bulletin No. 122 of U. S. Dept. of Agriculture. The method is to soak cotton tape, an inch wide, in a saturated solution of corrosive sublimate (deadly poison), allow it to dry, and then fasten it around a tableleg, or on the edge of a book shelf, etc If the tape remains dry it serves for months as a repellent to ant invasions

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Notices & Reviews.

Pocket Electric Lamp

We have the pleasure to receive a pocket Electric Lamp from the Eastern Electric Trading Co, of Karachi. It is priced at Rs. 2-8. The article is a good one and we can recommend it to the public. It gives a continuous light for 4 or 5 hours. The dry battery is of the flash lamp type and the voltage is 2 6.

Hair Oil and Soaps.

We feel it a great pleasure to receive a phial of scented hair oil, a packet of shampoo powder, and 4 cakes of soaps from H. Puran Chundra & Co., of Landhaura Sta e, U. P. Pushpa Kesh ringai, the hair oil, is just like the renowned Keshranjan hair oil but the colour is pale yellow. It sells at Re. 1 per 2 oz phial each. The price of soaps ranges from 1 anna to 4 annas per cake. The articles are good and we can safely recommend them to the public.

"Tibbe-Mashiha."

Or Sahaj Hakemi Shikhya—A primary treatise in Bengalee on the study of medicine according to the Hakemi System. We have gone through this Volume which is prepared by Hakim Masihur Ruhaman Quaraishi of 114 Mechua Bazar St. with much pleasure. And we are convinced that the claim of the author that the system will be intelligible even to the lay man, has been fulfilled. Those who are interested in the subject of Hakimi treatment of diseases should go through the vol. which is priced at Rs. 2 only.

Industry Buyers' & Sellers' Guide.

Taj Bahadur, Colonelganj, Cawnpur.—Wants to buy Carbozone gas in solution and sal nitro hydrate.

N. R. Godbole, Kanjee Khetse Bldg., Bombay No 4. Wants buyers and agents for stick hair dye, priced at one rupee each.

Krishna Das, Chunar: —Wants to dispose of (1) an original B. S. A. Cycle, (2) a tricycle, and (3) Mr. Sandow's own combined developer and S. G. Dumbells.

Md. A Majeed Khan, 4, Nullagootta, Secunderabad, Deccan. The address given would be enough or you can write to the manager, The Friends Assam Agency, 240'1 Upper Circular Road, for quotations of tea seeds.

N. S. Rama Rao, 2, Nallabhamby Mudaly St, Tripilcane. Wants to buy used postage stamps of Native States and Br. India

S. M. Husain, Kalsia, State, Chachrauli, Via Jagadhri, N. W, Ry. Wants addresses of Indian firms (1) which supply goods for soap making, (2) which print labels, (3) which manufacture paperboxes; and (4) which supply engraved stamping blocks for stamping the cakes of soaps.

L. S. Rao, Post Master, Kampli, Dt. Bellary. Wants (1) New Am. process for block making, (2) addresses of firms which supply (a) second hand photographic goods, and (b) exchange gramaphone records and pins for new ones.

S. Shamoujengar, C. M. Agent, Melkote, Via Bangalore. Can any firm of Bombay or Calcutta supply him with Japan refned silk and other Japanese goods?

P. Sevamaiah, Bezwada. Wants to buy cellulose.

H. M. Mair, Narwana. For materials for dry battery making please write to G. N. Mytu, Postal Tuition School Bari Dholpur, or to B. Borooah & Co., Bowbazar St. Calcutta. Wants buyers of crude and refined castor oil.

J. K. Ghose, Taipoo Tea Estate P. O. Pagdogra, Via Siliguri. Dt Darjeeling. Wants to buy pictures by Raja Ravi Varma.

C. Govindarajalu Naidu Cuddalore O. T. He is willing (1) to be an agent of any jute mill of Calcutta or Bombay to canvass work on Commission basis (2) to ship groundnuts oil etc in any quantity and to work on commission system. Wants addresses of firms which are dealing with the groundnut buyers of Hamburg, Marseilles and other places. He can supply cocoanut fibre in any quantity. Wants buyers of Keshwar ananda pills and Sarsaparilla Coffee powder. For rope making machine please write to Ernest Lebmann, Manchester, England.

S. D. Bhandari & Co Hafizabad, Punjab. Wants to buy Harrisson Knitting machines on wholesale rates. What Commission can they expect? They can undertake to distribute advertisements throughout the Punjab on Commission They beg to inform the manager of the Am Trading Co. Cottonpet, Bangalore City that they offer themselves as agents for selling knitting machines on 20 p. c. discount and so request him to send them full particulars.

Manager, the Am. Trading Co. Cottonpet Bangalore City. Begs to inform that he can supply Harrison Nittol Ribber Knitting machine for Rs 85 and he takes the articles and pays to his customers. He can supply cotton socks Re 1|8 and banyans at Rs 3

per dozen. He can supply cheap American typewriters. He informs Mr. C. P. Bajpai Gorakhpur that there is an instrument named Goldometer to find out riches hidden in the earth. It will locate gold, silver, minerals, and other precious metals. He can supply the same for Rs 100. He can supply anykind of formulas also for a small remuneration.

Ramnarain, Tandianwalla. Please communicate with the manager of the Foreign Goods Supplying Agency, Ahmedabad, for agentship of the Red Lamp brand Cigarettes.

Mr. S. B. Banerjee, 30, Hari Ghose's Street, Calcutta, wants sole agencies for lime, minerals, oils, ghi, country produce, cigarette, etc., for Calcutta and Bengal generally, on commission terms He has facility for selling these goods in the local markets. Bank reference given, and respectable parties alone are dealt with.

N. B., C|o Industry, is ready to teach any kind of Arts and manufactures by correspondence on a moderate charge For mulas of any kind are supplied at a nominal cost.

Formulas, Processes & Answers, Etc.

To Polish Brass Articles.

Mr. L.P, Ahraura writes : will you kindly give a formula for polishing brass articles?

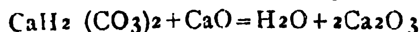
Many such preparations are on the market. Almost all of them contain Chalk, rotten Stone, tripoli, or emery powders. The following may be used:—(1)Quartz sand powdered and levigated, 40 parts ; Paris red 60 parts. Pass though a sieve and make a cream with 100 parts of vaseline. Dip a Cotton or wollen cloth and polish with it. (2) Emery flour, finest levigated, 100 parts ; Paris red, 100 parts. Pass through a sieve and mix with a mixture of suet, 80 parts and oleic acid, 80 parts Use as above

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To Soften Hard Water.

The same gentleman writes :– I have a well, the water of which is hard or saline. Can you suggest how to make it soft.

It is very difficult to suggest anything without knowing the exact impurities present in the water. It can only be known by chemical and microscopical analysis. Well water or waters in general contain various kinds of impurities and there are various ways for removing them separately. You ought to read a copy of "A simple method of water Analysis." by J. C Thresh, M. D., D. Sc., etc. However, you can adopt Clark's process, which is used for removing temporary hardness of water Lime water is added in sufficient quantity to exactly combine with the dissolved carbon dioxide gas The whole of the lime, both that originally present in the water as carbonate and that added as hydrate, is pptd, and the hardness of the water is thus removed. The chemical reaction is represented in the following equation :—



$$CaH_2(CO_3)_2 + CaO = H_2O + 2Ca_2O_3$$

The pptd lime is removed either by allowing it to subside or by filtration.

Permanently hard water can be rendered soft by chemical means. In the laundry sodium carbonate is used. This throws the calcium and magnesium out of the solution in the form of carbonate. But it should be remembered that all shallow well waters are considered to be dangerous.

Various Terms of Musk Seeds.

T. L. U., Mysore, writes :—Will you kindly give the vernacular equivalents of the musk seed? Also where to get it?

The article can be obtained from any renowned chemist's and druggist's stores. The following are the various vernacular equivalents :—

Mushk dana, Hind.; *Mushak-dana*, Beng.; *Mushk bhendi ke bij*, Dek.; *Mishk-dana*, Bomb.; *Mushak dana*, Guz.; *Kasturi-venduik kai-virai*, *Kattuk Kasturi*, Tam.; *Kasturi benda-vittulu* (*nela bendai* Elliot), Tel; *Kattu Kasturi*, *Kasturi venta vittu*, Malay.; *Ba-lu-wa* (Mason, *contradicted by* Moodeen Sheriff) Burm.; *Latakasturika* (*lata kasturikam* Moodeen Sheriff,) Sans.; *Habbul-Mishk*, *habbul-mushk*, Arab,; *mushk-dana*, Pers.

Gloss for Laundry Work

(Illegible), Madras, writes : Will you kindly give a recipe for liquid gloss for laundry work ?

The following may be tried : Gum Arabic, 8 parts ; Borax, 8 parts ; Glycerine, 12 parts ; spermaceti, 6 parts ; water, 120 parts. Melt the spermaceti on a water bath and mix all by trituration in a warm Wedgewood mortar. Used for polishing shirt bottoms, collars, cuffs, etc.

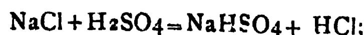
How to Make Washing Soda.

R. A. M., Hyderabad, writes : Will you kindly let me know how washing soda is prepared ?

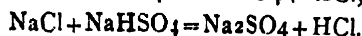
Kindly consult any higher text book of chemistry, for space would not allow us to give the details of the processes. However, we give here the main outlines of the processes. The preparation of this compound is carried on by two methods, and constitutes that important industry, the *alkali manufacture*. The two processes are known by the names of their respective discoverers, namely, (I) the *Leblanch* process, and (II) the *Solvey* process, the latter being also known as *ammonia soda* process.

I. The Leblanc method of manufacture consists essentially of three processes, namely—

(a) the conversion of sodium chloride or common salt into sodium sulphate or Glauber's salt by the action of sulphuric acid, known as the *saltcake* process. Two chemical reactions are involved in the process—

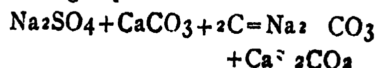


$$NaCl + H_2SO_4 = NaHSO_4 + HCl;$$



$$NaCl + NaHSO_4 = Na_2SO_4 + HCl.$$

(b) The decomposition of sodium sulphate, *saltcake*, by means of calcium carbonate (limestone) and coal, at a high temperature, whereby a crude mixture of sodium carbonate and calcium sulphide is obtained, known as *black ash*. This black-ash process takes place in accordance with the following equation—

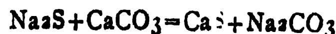


$$Na_2SO_4 + CaCO_3 + 2C = Na_2CO_3 + CaS + 2CO_2$$

The change may be conveniently regarded as taking place in two stages, which proceed simultaneously, according to the equations—



$$Na_2SO_4 + 2C = Na_2S + 2CO_2$$



$$Na_2S + CaCO_3 = CaS + Na_2CO_3$$

(c) The process of extracting and purifying the sodium carbonate contained in the *blackash*.

II. *The Ammonia Soda Process.*—This process is based upon the fact, that hydrogen ammonium carbonate (*bicarbonate of*

ammonia) is decomposed by a strong solution of sodium chloride, according to the equation—



$$4(NH_4)CO_3 + NaCl = HNaCO_3 + NH_4Cl.$$

In practice, the brine is first saturated with ammonia gas, and the cooled ammonical liquid is then charged with carbon dioxide, under moderate pressure, in carbonate (*bicarbonate of soda*), being much less soluble, separates out, leaving the more soluble ammonium chloride in solution, from which the ammonia is recovered by subsequent treatment with lime.

The hydrogen sodium carbonate is converted into normal sodium carbonate by calcination, and the carbon dioxide evolved is again utilized in carbonating a further quality of ammonical brine—

Sodium carbonate crystallises in large, transparent, monosymmetric crystals, commonly known as "soda" or "washing soda." On exposure to the air, the crystals give up water, and become effloresced upon the surface, and finally fall to powder. When crystallised from hot solutions, it forms rhombic crystals, containing $7H_2O$. The solubility of sodium carbonate in water increases with rise of temperature, reaching a maximum of 32.5°, when 100° parts of water dissolve 59 parts of the salt. Above this temperature the solubility falls, and at 100° the ammount dissolved is 45·4 parts.

Brief Queries and Answers.

M. P. Masulipatam wants to Knows (1) which is the best Knitter? (2) whether cylindrical or flat macines or both are used for knitting all sorts of goods; (3) The names of firms in India which buy the finished articles and export them; (4) The names of foreign firms whieh import goods into their countries; and (5) a list of articles which can be made on the knitters.

K. S M., Udaipur, wants (1) to become an agent of any reliable firm. (2) The subject will be treated in due time. (3) The industries which you name are profitable on a large scale, but they bring in small profits if begun on a small scale. (4) A book to suit you is Andel's Household Helps, Hints and Recipes. It contains 3000 practical recipes and is priced at Rs 2 8 (5) We know of no such institution. (6) can any physician recommend a medicine for infantile paralysis? (7) wants to buy a secondhand ærated water machinery. It is not profitable to generate the gas locally.

S. D. B. & Co Hafizabad.—There are many washing factories working at Calcutta, Madras and Delhi. (2) A Remington machine is on sale by one of our readers. It is in a now condition Original price is Rs 110 but can take Rs 80 (3) consult the addresses given on page 70 or 100 of vol. IV.

S.C.B. Lakhimpur, wants to know (1) the value of foreign steel and tin boxes and trunks imported into India during the last 3 years; (2) value of steel and tin per maund.; and (3) number of bones or value of same carried into Assam from other provinces of India.

M. A. K. Lyallpur. (1) Independent pens are made of vulcanite or ebonite. (2) we cannot give you the estimate for starting such a factory. (3) Asks if any reader can inform him about the uses of Delas and Tumuna, both forest products. (4) where he can get a market for the same. (5) write to Messrs Blair Campbell and MacLean Ltd Woodvile St, Govan, Glasgow, for the plant of wood distillation, mentioning INDUSTRY.

S. R. B. Sunam.—The maunfacture of hectograph without gelatine is a trade secret.

S G. S Jamunia.—Thermo flasks may suit your purpose.

M. K. S. Ramisankali.—The fruits, when ripe, are eaten itself, or are made into condiments.

M. T P. Larkana.—wants to know (1) how brass wire is hardened without lengthening it and (2) how candles are polished.

P. C. Menktal.—An article on hectograph has appeared on page 156 of vol. II.

P. M. B. C. Pondichery.—wants addresses of German firms which manufacture gilt picture frames.

B. L. M. Singapore.—wants addresses of firms which sell cinema films like gramaphone records; will they suit the ordinary machines ?

H. D. M. Narwana,—For a suitable oil mill write to Messrs Jessop & Co, of Calcutta. (2) The subject has been fully treated in Vol. VI Part I of Dr. Watt's Dictionary of the Economic Products of India (3) A book to suit your purpose is potato culture by P. C. De, F. R. H. S. and priced at As. 6 only. It can be obtained at 28·1 Beadon Row, Calcutta. There is another book named Potatoes, by Pink, Re. 1-8.

R. L. B, Rawalpindi.—Red wine is a kind of imported foreign wine. There are many varieties of them, but anyone will suit the purpose. It can be obtained from European wine dealers of any large city.

M. T. & Co, Shikarpur.—Wants addresses of piece goods merchants of Germany, Holland and Belgium which is the cheapest enlarging house in Europe ?

G. V., Bombay.—Wants addresses of firms which deal in machinery for making gas mantles

Agricultural Inspector, Aligarh.—Please communicate with the writer, whose addresses is Postal Tution School, Bari, Dholpur.

C B. D., Multan.—For the formu'a, see page 67 of Vol IV.

Banker, Rampur.—We do not know whether there is any Urdu edition of the "Mysteries of the Court of London."

Mr H. D., Belgachia—A few grains of benzoic acid may be added instead of benzoating the base oil with heat, (2) you can write to Messrs. D. Waldie & Co. of Konnagore for the oil. (3) No machinery is used for making hair oils. (4) There is no such book in Bengali but our chemist can write out one for you for a small fee. (5) Wants to buy a second-kand Bengali Printing press.

A. V. N., Madapur.—The book can be had from Messrs Thacker, Spink & Co. of Calcutta. Asks if any physician can teach him the medical science by correspondence.

M. P. T., Prome.—The book can be had from Messrs D. B. Taraporeval a Sons & Co. of Bombay.

M. K. P., Maymyo.—Wants full addresses of the following :—(1) Royal Agricultural Society, (2) Royal Horticultural Society.

D. R., Kudnamkulam.—An article on the subject has appeared on page 46 of Vol. I.

S. P., Delhi.—See reply to M. P. T., Prome, above.

Important Notice.

The subscribers are requested to quote their Roll No. which will be found on the cover of the paper against their names in any communications with this office.

The subscribers who have missed any of the stray copies of Vol IV. are requested to ask for a duplicate copy early as such despatch of duplicates for Vol IV will be soon discontinued.

MANAGER.

Calcutta Market.

Calcutta, July 8.

EXCHANGE.

Bank T T	1-3 15 16at 1-3 31-2	
Bank O D	1-3 31-32	
3 Months' D A	1-4 ¼	Firm.
6 " "	1-4 5-16	

MARKET WEAK.

Government Loans.

3 Per cent cash	... 82 to 83
3 1-2 do "	... 95-14 to 95-15
3 1-2 do month sight	... 95-11 to 95-12
3 1-2 do Bombay	... 95 '4

Interest and Discount.

Bank of England from 29th Jan. 1914	3 %
Bank of Bombay from 4th June 1914	4 "
Bank of Bengal from 4th June 1914	4 "
Bank of Madras from 8th June 1914	7 "

BULLION MARKET.

GOLD—	Rs.
English Bar—100 (touch) per tola ...	24-1-9
Australian Bar—(100 touch) ...	24-3-0
Sovereign—Victoria Shield, per piece	15-6-0
SILVER—	
English Silver Bar of 17 ½ dwt better per 100 tollahs ...	75-14

PRODUCE MARKET.—July 8

RICE.

Dwadkhani Rice	Rs 6-8 to 7-4 per md
Banktulshi	Rs 5-10 to 6-4
Boiled Patna	Rs 5-1 to 5-12
Ballam	Rs 5-12 to 6
Kazla	Rs 4-2 to 4-6

DAL

Moog Dal at Rs 6-8 (For Black kinds) Yellow at Rs 8 8 to 9-0

Masur Dal at Rs 6-8 per md

Arhar Dal at Rs 5-0 to Rs 5-6 per md

How did Badshas and Begums enjoy ever-lasting youth ?

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Ramaniranjan Tela & Premranjan Tela.

These are *secret* medicines. I have secured them only from my ancestors who were the Hakims of the mighty Emperors of DELHI and AGRA They are known only to us and none else. Please try, also

THE WONDERFUL CATECHU.

There is no equal or second to it. The greatest charmer ever found.

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Write at once :—

Hakim Masihur Rahman.

Unani Medical Hall 114-15A Mechua Bazar St, Calcutta.

Telegraphic Address—"*Begumbahar*" Calcutta.

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CONTENTS.

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Industry Royal Ed

A Monthly Journal of Handicrafts & Commerce

VOL V CALCUTTA AUGUST 19 1 NO 53

The War: How it Affects Trade.

War has it ... everything ... civilized ... perity ... and ... alike ... time ... panic, but ... and try to bring ... of human natu... only th n we shall ... men and not mere ... the sun

The present war in Europe ha ... a very uneasy feeling throughout the world It is no wonder it is natural ... a terrible devastating war of such a magnitude, in which 8 most powerful, enlightened and civilized nations with their millions of combatants and all the modern scientific resources of warfare, have never been recorded within human memory It is a horrible war.

... endless ... enter ... hope of ... will have ... as a ... It is ... already ... food prices ... Austria The ... Vessels ... owing to the impossibility ... policies The cables ... some sailing and hurrying forward others. The stock markets of the world ... at a standstill Scenes occurred in the wheat pit which have been unprecedented since the Leiter corner in 1898 Transactions were made in over twelve millions bushels and prices rose ... cents. Wednesday, July 29, will long be

remembered as the blackest day ever known on the London Stock Exchange. Such universal cessation of business is unprecedented. The extent of the depression was illustrated by the closing of the Montreal and Toronto Exchanges. Sugar is two pounds sterling higher per ton in England. London stock Exchange has closed until further notice." In India itself markets have been disorganised. "As the conflict in Europe will check, or prohibit, the exportation of beet sugar," writes our contemporary, *Commerce* "the cane varieties of Java were immediately in great demand, the value of Brown Java travelling from Rs. 5-14 per maund to Rs 6 4, Friday's (31st July) quotation. Linseed fell in price, from Rs. 6 5 to Rs 5-14, owing to the congested stock of this commodity at the Kidderpore sheds. The Jute market became stagnant, there being no buying either from London or the Continent, and from Rs. 67 2 the price fell to Rs. 64 12 on Thursday (30th July,) and to Rs. 58 8 on Friday (31st July) There was a tremendous slump in Government paper from Rs. 97 to Rs. 94-9 In piece-goods the position is not so depressing, for ample stocks of Manchester goods are held in Calcutta. The Bengal coal trade is also sure to be advantaged by the crisis. The war tension has not yet produced much effect on the Bombay money market, and the Port Trust new loan closed on Tuesday (Aug. 4) at the average rate of 100-9-c, Foreign shipping lines are refusing to book from Karachi to the Continent and the Hansa Line has received instructions to decline all business until further orders. Fortunately for Madras the War broke out at a time when the least possible dislocation to the local export trade could result," writes the 'Madras Mail."

But the aspect in Bengal is most gloomy. Rice, Coal, Jute and Tea are her principal items of export. A few months' suspension of export is bound to bring about disastrous results on people interested in the jute trade of Bengal, the home of Jute. Jute is a perishable article and should be kept under cover during this rainy season. Growers of jute have very limited storing accomodations and unless the usual carrying operations be resorted to, of which there is very little chance There will be serious congestion at most of the jute centres. Calcutta and its suburban godowns and stores can accomodate only a small fraction of the normal crop of the year. The jute mills have enough stuff from last season's crop to engage them up to the end of October, working full time. But as export trade has suspended, the mills are already working less than half time and so they are not likely to take fresh stores for nearly half a year to come. On the whole, the effect of war on the jute trade will bring disasters on the interested rayats, zemindars, merchants, brokers and operatives alike. While the decay of raw jute left in the rains is a sure menace to public health the possible throwing out of employment of a huge army of mill hands is likely to bring theft and plunder in its train to the great inconvenience of the peaceful inhabitants of the Province It is high time that the Government of our beloved Governor should step in and protect both the producer and the consumer in a principal manner by conserving the jute crop until normal conditions are restored wholly or partially. We are of opinion that some sort of taccavi advance to the ryots and the temporary suspension of the sunset law for the Zeminders will go a great way to solve the problems.

As to tea, though it i not so perishable a commodity like jute, yet its booming pros perity of the recent years is bound to suffer a great check and that may affect materially the prospects of shareholders in compara tively new concern and those owning virgin fields As Russia is a great consumer of Indian and Ceylon teas (and as her shipping is disorganised we can t hope for any bright er prospects until the trade routes can be kept safe by the British Navy or tea being transhipped to British ships for ex ortation through Persia or by any other means such as by the N W Frontier trade routes and also until the necessary ban ing arrange ments can be made.

With a normal c op of rice and a crippl ed export, it is hoped a g neral foo l famine may be averted if the Government and the Zemindars co-operate in keeping down the prices within reasonable limits

Coal alone presents a brighter prospect as a direct eff ct of the war For it is very probable that every available ton of coal will be requisitioned for shipping as th stock of English coal in all British ports is b ing re served for the Navy. So a good rise in prices of coal can be calculated upon and so a sub tantial profit is assured to th colliery pro prietors There is also anoth r side o the shield—a 't ut, we m an, let not the middle class men and the poor suffer.

Another article which will suffer by the present war is silk For jute and cotton goods good demand will no doubt exist as for the necessaries of life, but purchasers of silk will be few and far between until better days come again The crop season in Europe recently came to a close and has been a very quiet one this year The war must also have the effect for the time being of discouraging the cultivation of silk in Bengal

The export of hides have been stopped The flour mill industry has received a spurt and prices of wheat tend upwards Swedish and Austrian matches can not be imported also Japan may supply a fraction.

Now, as the world is convulsed, literally from pole to pole, who is to blame for the present huge catastrophe? The verdict of th world is against Germany Her action is that of an lunatic man although she claims to maintain her position 'in the sun against th devils of the world '

She has dragged Europe and the world at large into this conflagration It may be that she has been impelled to this mad brain ed excursion by th condition of her own financial resources and the pressure of her own economic requirements And our es teemed contemporary *Commerce* justly re mark no thoughtful person could fail to sympathise with Germany in her endea vours to acquire the position of a great manufacturing nation in spite of many hindran ces In this respect she had already achiev ed much, and her industrial future was as sure In trade and commerce she had taken the lead in many directions, especially where scientific principles are applied to manufactures, and it behoved her to pro ceed peacefully towards the fulfilment of the wholesome aspirations of her industrious people Instead of which she has sought to do by brute force what could and would have been encompassed upon the peaceful paths of commerce, and there are even now, at this early hour, indications that the imprudence of her crazy quest will end ultimately in her own undoing"

Now, as every British, Scotch and Irish

men here and in the overseas Dominions, and the Chiefs and Princes of the Native States of India are trying their best to serve the King and the State in anyway they can, and as on the other hand we, the natives of India, are debarred from being enlisted as volunteers or otherwise, what are we to do in this common danger? If we keep our heads cool, we can turn this crisis into good account for ourselves. This war has come as a blessing and let us take time by the forelock. We can acheive much. Let us muster strong and form into volunteer corps ourselves. Let every man, who earns over Rs 50 per month, or who has means to spare a day's income, subscribe their quota to form a common fund. Let this sum when collected, be distributed to the labourers who will be thrown out of employment, to destitute families whose supporters may in any way suffer in this war and to the poor, the sick and the really needy. Let us see also, if the Government do not check the raising of prices of foodstuffs, that selfish interests on the part of the modi, the stationer, the vegetable seller, the grocer and the druggist may not play any part in this time of crisis. Let the volunteers buy the necessities of life themselves and sell them from door to door, from village to village and from town to town, as they so gloriously and nobly did during the Swadeshi movement, at reasonable rates without looking for any personal gain in any way. The puja is [illegible] rise up young Bengal, enough glorious [illegible] is waiting for you. See that your poor brethren, your sisters, your parents, your relatives and your friends, the ryots do not shed tears in privation and misery. Boycott all German and Austrian goods; they are cheap, rubbish as you know to your own cost; shun their cheap pen, pencils, knives, scissors, razors, silk, cotton and woolen articles, matches, blackings, perfumery and toilet preparations, spoons, enamelled wares, i. e. in fact all the articles which are labelled and gold "made in Germany" and "made in Austria" Now is your time to give impetus to your own handicrafts and indegenous industries, now is your time to encourage the weavers, the artisans, the braziers, the blacksmiths, the gold and silversmiths, the stone workers, the potters; the glass makers, the match manufacturers, the shoe makers, the hosiers, the perfumers, etc. You are an intelligent sober, industrious, and educated nation; your mission is peace and charity and not in the field of blood where the hydra-headed demon, War, is bringing woe and pestilence, misery and tears of blood, in millions of families. Will you—you, sons of modern India, fail in your duty towards your countrymen, to the state and to the King? Do you wish to crown yourself with the laurel of peace? Do we appeal in vain.

The Art of Distillation & Essential Oil.—III.

(*Continued from page 83*)

OIL OF CITRON FLOWERS.—Amber-coloured; highly fragrant. *Prod.* 60 lbs. yield 1 oz

OIL OF CLOVES. From the unexpanded flowers, soaked for sometime in sa't and water and then submitted to distillation; the distilled water, after having deposited its oil, being returned 3 or 4 times into the still, and again 'worked off' from the same materials Nearly colourless, when recent, gradually becoming pale yellow, and ultimately light brown, by age, highly aromatic, with characteristic odour and flavour of cloves. It is the least volatile of the essential oils. (-4° Dr. Gladstone) Sp. gr. 1.0475 (Dr Gladstone), 1 055 to 1 061 Deposits crystals at 2 F *Prod.* 1 lb yield 2½ oz Cooley says 16 p c. to 22 p c. It consists of (1) Eugenol, or Eugenic acid, 85 p. c. and (2) a hydro carbon, caryophyllene. Oil of cloves is frequently adulterated with inferior essential oils, especially with those of pimento, pinks, and clove-gilly flowers, and occasionally with castor oil. (1) Pure oil of cloves forms a butyraceous coagulum when shaken with liquor ammonia, which crystallizes after fusion by a gentle heat. (2) Treated with an alcoholic solution of potassa, it entirely congeals into a crystalline mass, with total loss of its characteristic odour. (3) Shaken with an equal volume of strong caustic soda lye, it forms, on repose, a mass of delicate lamellar crystals. (4) Solution of chromate of potassa converts it into brown flakes, whilst the salt loses its yellow colour. (5) Chlorine turns it first green, and then brown and resinous. (6) Nitric acid turns it red, and a reddish brown solid mass is formed; with heat, it converts it into oxalic acid. (7) It dissolves freely in sulphuric acid, yielding a transparent, deep reddish brown solution, without any visible decomposition. (8) Mixed, gradually, with about 113 of its weight of sulphuric acid, an acid liquor is formed, together with a resin of a rich-purple colour, which, after being washed, is hard and brittle, and forms a red tincture with rectified spirit, which is precipitated of a blood red colour by water. (9) It dissolves iodine freely, without any marked reaction. (10) It dissolves santaline freely.

OIL OF CORIANDER.—Whitish, yellowish, or colourless, aromatic; carminative. It consists of (1) coriandrol and (2) Pinene, 5 p. c (+21° Dr Gladstone). Sp. gr. 0 8775 *Prod.* 5½ to 6 p. c. Another authority says 0 7 to 1.1 p c.

OIL OF CUBEBS.—Aromatic, hot, and bitter tasted; odour, that of the fruit, colourless, when pure. It consists of (1) Dipentene, (2) Cadinene and (3) cubeb camphor Sp gr. 0.929 to 0.9414. *Prod.* 9 to 11 p c, when pure, iodine has little action on this oil, and immediately gives a violet colour, without any very marked reaction; nitric acid turns it opaque, and the mixture changes to a pale red when heated; sulphuric acid turns it to a crimson red. When adulterated with oil of turpentine, both its viscidity, solubility in rectified spirit, and its density are lessened, when mixed with castor oil, it leaves a greasy stain on paper.

OIL OF CUMIN.—In the Jaipur State of Rajputana a particularly good kind of cumin seed is grown. Pale yellow; smells and tastes strongly of the seed. It is a mixture of two oils differing in volatility, and which

may be separated by careful distillation The more volatile one has been named cymol, and the other, cuminol. Sp. gr. 0.975. *Prod.* 2½% to 3% nearly.

OIL OF DILL.—Pale yellow, odour, that of the fruit, taste, hot and pungent, carminative Chemically it is identical with oil of caraway. (+206°. Dr. Gladstone) Sp gr 0 881 to 0 882; 0 8922 (Dr. Gladstone) *Prod* 4% nearly.

OIL OF FENNEL—White or colourless, odour that of the plant, tastes hot and sweetish, congeals at 50°F; carminative and stomachic It consists of two oils, the one solid, and identical with that of oil of aniseed When treated with nitric acid it affords benzoin. Sp gr 0 997 *Prod.* 3 to 3½% The flowering herb yields 0 35% of a similar oil The oil of fennel of the shops is the product of the fruit of *Fœniculum vulgare*, or common wild, or bitter fennel, but is scarcely so agreeable either in taste or smell.

OIL OF GERANIUM—It is called oil of gingergrass, oil of spikenard, Roussa or Russa grass oil, or Grass oil of Namar. It is not obtained from any species of *Geranium* or *Pelargonium*, but from *Andropogon Schænanthus*, *A martinii*, *A. nardoidis*, or *A. calamus aromaticus* It is often employed to adulterate otto of roses (−4°, Dr. Gladstone) Pale straw colour. Sp gr. 0 9043. *Prod.* 112 lbs yield 2 ozs Deposits crystals at 2°F. Indian geranium oil boils at 420°F., while the Spanish at 430°F.

OIL OF GINGER.—Yellow or bluish green, Pale straw (Dr. Thresh), possesses a less agreeable odour than that of good ginger, without any pungency. Contains gingerol and other substances. Aromatic Sp. gr. 0.885 at 64°F., and is [illegible]. *Prod.* [illegible] to 1% (Dr. Raybaud). An interesting result of Mr. (now Dr.) J. C. Thresh M. D., "D. Sc.'s" analysis was the fact that a fine selected sample of Jamaica ginger contains only about half the quantity of essential oil found in Cochin and African samples, though about as much as the Cochin gingers. Though less in quantity however, the volatile oil of the Jamaica ginger possessed a much finer bouquet than the others (*Y. B. P. 1879, 1881 and 1882.*)

OIL OF LAUREL—It is also called oil of sweet bay From either the berries or leaves of *Laurus nobilis*, or *Sweet bay tree.* Pale yellow, clear, odorous, aromatic stimulant, and narcotic Sp gr 0 871 *Prod.* from the leaves, ¾ to 1 %.

OIL OF LAVENDER—See an article on Lavender in June 1914 issue of "Industry."

OIL OF LEMON Harvest time March to May From the yellow portion of the rind, grated, placed in hairbags, and exposed to powerful pressure, also by distillation, but the product is then less agreeably fragrant and sweet, but keeps better Nearly colourless or yellow, odour that of the fruit (+164°, Dr Gladstone) Sp. gr 0 8498 (Dr. Gladstone), 0 8751 to 0.8785 Expressed oil, 0 8517, distilled oil, 0 847 at 72 F. (Dr. Ure) *Prod* 100 lemons yield, by expression, 1 3/4 to 2 ozs. nearly, by distillation 1¼ to 1½ ozs. Boils at 345°F It consists of (1) a terpene called citrene or limonene, 90%, (2) citral or geranial, the aldehyde derived from geraniol found in oil of rose, and (3) citronellal, an aldehyde of the alcohol citronellol The oil is commonly adulterated with oil of turpentine, and occasionally with nut or poppy oils. When pure, it is soluble in all proportions in absolute alcohol, but rectified spirit only dissolved [illegible]

OIL OF LEMON GRASS.—It is also known as Indian grass oil, oil of verbena, or citronelle oil. Pale yellow powerfully fragrant. Boils at 440°F. Congeals to a jelly at −5°F. Sp. gr. 0.8932 (−3°?, Dr, Gladstone.)

OIL OF LEMON THYME,—From the fresh flowering herb of *thymus serphyllum*, the lemon or wild thyme. Very fragrant Used to scent soaps. Sp gr. 0 867. *Prod* 100 lbs. yield 2½ to 5½ ozs., of oil. When pure, it is scarcely affected by iodine, but solution of chromate of potassa acts on it with energy.

OIL OF LIMES.—From the rind of limes, as oil of lemons, which it somewhat resembles. *Prod.* 100 limes yield 2¼ to 2½ ozs. of oil.

OIL OF MACE—From the arillus of *Myrtstrica Officinalis*, nearly colourless, or yellow, fragrant; closely resembles oil of nutmeg Sp gr. 0 945 *Prod.* 4½ to 9 , or 2lbs. yield 3 ozs.

OIL OF MARJORAM.—From the fresh flowering herb of *Origanum Marjo na* Pale yellow; odourous, tonic, stimulant. Sp. gr. 0.925 (0 940° B). *Prod.* 0.33 to 0.5%.

OIL OF MEADOW SWEET. From the flowering tops of *Spiræa Ulmaria*, or Common meadow sweet This oil is a native hydride of salicyl. Yellow, fragrant; slightly soluble in water, which then strikes a deep violet colour with the sesquisalts of iron.

ARTIFICIAL OIL OF MEADOW SWEET.—This is prepared as follows:—Salicin, 1 part, is dissolved in distilled water, 10 parts, and being placed in a glass retort, bichromate of potassa, 1 part, is added, followed by sulphuric acid, 2½ parts, perviously dilu'ed with 4 times its weight of water; a gentle heat is next applied to the retort, and after the first effervescence resulting from the mutual reaction of the ingredients is over, the heat is increased, and the mixture is distilled for the oil in the usual manner. The product is absolutely identical with the natural oil.

OIL OF MILFOIL.—From the flowers of *Achillea Millefolium*, or yarrow. Green and blue Sp. gr. 0.852. *Prod* 14lbs of the dry flowers yielded 3 drs of oil.

OIL OF MYRRH. Colourless; thin; stimulant; smells strongly of the drug sp. 1.0189 (−136°, Dr Gladstone)

OIL OF MYRTLE.—Leaves, flowers and fruits together are distilled The oil is known as *Eau d' Ange.* Sp. gr. 0 8911(+21°, Dr Gladstone). *Prod.* 100 lbs of the fresh leaves yield 2½ to 5 ozs. of oil Dr. Watt says 5 ozs from 1 cwt of the leaves Another authority says 112 lbs. yield 5 ozs.

(To be continued).

Manufacture of Tobacco.

II

STRIPPING.

"It may be performed at any time, provided the leaves after being once properly dried have again become pliable. For stripping such a number of plants as will furnish work for several days should be taken down on a morning when the plants have absorbed some moisture and have become elastic; they should be put in a heap and properly covered to check evaporation. If, however, the night air should be so very dry that the leaves cannot absorb sufficient moisture to become pliable, then a moist atmosphere may be created either by steam, or by pouring water on the floor, or by keeping chatties with water in the shed, If this cannot be done, the tobacco must remain hanging until there is damp weather, Under no condition should the tobacco be stripped when

not pliant, that is, if the leaves are so brittle that they would break when bent or rolled.

SORTING.

"Tobacco intended for smoking should be carefully stored when stripped There should be four sorts, *viz.*, *1st*, large equally good coloured untorn leaves, *2nd*, leaves of good size and colour but torn, *3rd*, leaves of inferior colour and bottom leaves, and *4th*, the refuse containing shrivelled up leaves, etc, to which may be added the suckers Leaves under No. 1 when thin, elastic, and of good species, are mostly valued as wrappers (outside covers) for cigars. No. 2 may also be used as wrappers, but are less valued than No 1, they are adapted for fillars and cut tabacco. The leaves should then be made into hands that is, 10 to 20 leaves should be tied together by twisting a leaf round the end of the stalks, each sort should be attended by a special man to avoid mixing When making the hands of the two first sorts, the man should take each leaf separately, smoothen the same on a flat board, leave it there and take another leaf, treating it in the same way and continue thus until a sufficient number is ready to make a hand. When the hand is ready it should be laid aside and a weight placed upon it to keep the leaves smooth.

BULKING.

"Bulking means placing the tobacco leaves in heaps for the purpose of heating it, in order to attain colour and flavour, this is carried out in various ways, nearly all of which involving great labour and risk. In most instances tobacco loses more or less in value during the process called curing It must here be mentioned that the more care is taken in raising the crop the less attention the tobacco requires in the shed. With a good species of tobacco grown on light friable soil, treated as laid down in this paper and the leaves dried as mentioned above, little care will be needed, after the leaves are dried and stripped By the drying process described, the leaves will have undergone a slow-fermentation which makes it unnecessary to watch or guide a reguler fermentation afterwards, hence bulking and fermenting as generally understood, are not required. If the colour of the leaves is not uniform, or if it is desired to give them a browner colour, then the heaps must be made large and a somewhat moist atmosphere is required in the stormy room This will cause fermentation to set in a short time, and the heat to rise after some days so much that rebulking is required, which is done by putting the top leaves of the old heap at the bottom of the new one. Under such circumstances, the heaps must be frequently examined during the first few weeks to prevent over heated after the first 14 days and again a month later to ascertain the exact state in which it is sometimes the tobacco becomes mouldy, this may occur especially with tobacco which has been manured with chlorides, which cause the tobacco to become more hygrocopic than when manured otherwise. If this occurs, the mould must be brushed off and, if necessary, the tobacco dried The tobacco may now remain heaped in the storeroom until there is a chance for sale It is sometimes the custom to subject the tobacco leaves to some sort of improvement. There is no doubt that by proper application of ingredients the value of tobacco may be much enhanced. The most costly tobacco often commands a high price, not so much on accounts of its inherent flavour as on account of that given to it artificially. [illegible]

most instances the best course to be adopted is to leave the improvemont of the leaves to the manufacturer. Many ingredients are employed to improve smoking tobacco They tend -(1) to make the tobacco more elastic and flexible , (2) to remove the coarse flavour ; (3) to add a particular flavour ; (4) to improve the burning quality ; and (5) to improve the colour. To make the tobacco more flexible and pliant, the leaves are macerated in, or sprinkled with, a solution of sugar. In hot countries this is often necessary to give tobacco such an elasticity as to become fit for handling especially when intended for wrappers, and may be done by an intelligent cultivator. To remove the coarse flavour, tobacco is often macerated in water, or in a solution of hydiochloric acid ; the more coarse the flavour of the tobacco, the stronger is the solution used. Sometimes tobacco is steeped in a mixture of sugar solution diluted hydrochloric acid. To extract the fatty matter, tobacco is macerated in alcohol or spirit of wine. In the maceration of tobacco for the purpose of influencing the flavour the following ingredients are mostly in use, cognac, vanilla, Sugar, rosewood Cassia, clove, benzoin, citron oil, rosewood oil, thyme, lavender, raisins, sassafras wood, orange, and many others. (For the compositions see an article on Tobacco by Dr. G. B. Kalyanram in vol. III of Industry.--Ed. I) The burning quality is improved by macerating tobacco in, or sprinkling it with, a solution of carbonate of potash acetate of potash, acetate of lime, saltpetre, etc. Badly burning cigars inserted for a moment in such solutions are much improved. Tobacco treated with acetate of lime yields a very white ash. The Colour of tobacco is sometimes improved by fumigating the leaves with sulphur and by application of ochre and curcuma. Although it may be said that fine tobacco generally do not require any impregnation with foreign matter for the sake of flavour, yet the manufacturer resorts frequently to it to give the leaf a particular aroma. An inferier tobacco, however which often would not find a market, is sometimes so much improved by artificial means, as to compete successfully with the genuine fine article. A special preparation of tobacco for snuff is seldom attempted by the cultivator. With reference to the preparation of tobacco for export, the sorting of the leaf is of the utmost importance. Only first and second sorts should be exported. It would be well to remove the midribs whereby the cost of transport and customs duty would be greatly reduced. Finally, it must be mentioned that the value of a cigar depends, not only on the intrinsic value of the leaf but to a great extent on the mode of manufacturing the article. Thus, the raw material may be of good quality, but if the maker does not classify the leaves properly, or, if he rolls his cigars too hard which must vary according to the qualities of the leaves, the cigar will burnbadly. The best burning leaves must always be used for wrappers. If this should be neglected, the inside of the cigar burns faster than the covering, the air has no access to the burning parts, and the empyreumatical substances are volatilised without being decomposed. Such cigars therefore, make much smoke and smell badly."

Manufacture of Leather.

The exportation of hides and skins to the European continents is so much extensive that the present war has affected the trade very seriously. And considering that the same hides when finished are again imported either as manufactured leather goods or as simple leather, it is apprehended that the leather market will be very tight. Yet we can prepare leather ourselves in India when we have such a plenty of supply of raw hides.

Our countrymen have long been acquainted with the methods of tanning and they generally employ for that purpose the hides of buffalo, bullock and cow also the skins of goats and sheep Superior kind of leather is exported from European countries and sometimes made into leather wares here.

Leather consists of hides and skins of certain animals, separated from fleshy and fatty matters and prepared by means of chemical agents in such a way that they resist the influences to which they are naturally subject. Skins in their fresh state are tough, flexible, and apparently well suited for clothing, &c. ; but on drying they become hard, horny, pervious to water, and finally putrid. These changes are prevented by the processes of the leather manufacturer, and at the same time the skin is rendered stronger, more impermeable to water, more supple and less likely to be affected by wear and tear. The final result of the processes ordinarily employed is a chemical combination of certain constituents of the skin with tannin Two other processes are, however, occasionally followed by one of which 'tawed leather' is produced through the action of mineral salts, by the other "shamoyed leather" is formed, in which the skins are combined with oils or fatty substances.

In Cawnpore there is a Government Tannery and the methods pursued there may be interest to our leather workers. We make no appology to quote it from the Records of the Government of India as it gives a full and interesting account of the processes most likely to give good results with Indian hides

TANNING.

BUILDING.—"The tannery consists of a large building, in the floor of which are masonry pits plastered with chunam The floor is on two levels. The lower contains the BEAM HOUSE and LIME PITS, where the hair and flesh of hides are removed by the action of milk of lime ; also the BARK TAPS and 'SPENDERS' where the bark is infused. The latter are large masonry pits with false bottoms of wood, through which the infusion drains off by plug-holes into a well adjoining, where a pump is fixed, and the liquors are raised and carried into the tan pits on the higher level ; these are the pits in which the hides are "tanned" and they drain off into the spenders and taps on the lower level.

"The Currier's shop is a long two-storied building the lower story is furnished with currier's beams, and scouring tables of stone, where the hides are 'shaved' and scoured preparatory to being oiled and 'dubbed.' The upper story is for finishing the 'curying' process. It is furnished with wooden tables for setting out and "dubbing" the hides, which are hung up to dry on battens suspended from the roof. There are arrangements for hanging the hides on both stories.

"HIDES. The hides and skins tanned and cured are—buffalo bullock and cow, and goat and sheep skin.

"Buffalo Hides are obtained from the slaughter markets of Cawnpore and adjacent towns and cities. They are either green, direct from the butcher or dry-salted. They are best suited for tanning in the former condition, as the salt cure of the North-Western Provinces is inferior and imperfect, absorbing so much moisture that in the damp heat hides are apt to rot; while the dry heat of the climate so hardens and contracts the fibres of the skin that much labour is required to loosen the pores to receive the lime and tan. Great precaution, therefore, is necessary in the selection of dry-salted hides, especially as native dealers lay on the *kharee* or salt very thick to gain weight. If the hides are fresh slaughtered and have been lightly cured, they soak down to a natural state in about two days, but if they are stale, that is, have been cured some months and are besmeared with *kharee*, the tanner should reject them, for they will very likely decompose in the soak before becoming soft. Buffalo is the only available hide that will produce leather thick enough for harness work in this country; but there is no doubt that much of the inferiority of country leather arises from the poorness of the skin of that beast. It is poorly fed, not generally cared for, and usually killed when too old to breed or give milk.

The hide of the male buffalo is too coarse, and it gets such bad treatment in the plough or the cart that it is generally full of sores and goad-marks. In large towns there is a market for buffalo beef for the low caste and poorer Mussalman population, and also for grease, but the younger and better cattle are rarely slaugtered; it is from these that the local tanners select their hides for the finer uses of harness, saddlery, and accoutrements. Many good hides are ruined by the butchers in "flaying," from inefficient arrangements in the slaughter houses and from injudicious use of their tools.

"Bullock and Cow hides are also procured green and dry-salted, but the same care is necessary in selection. The animals slaughtered by the Commissariat Department are usually the best, but they are small and unfit for any thick work. This class of hides is much exported to England and extensively used there for boot and shoe upper leather for which it is much esteemed. In the English market there is great objection to North-West cured hides. Patna, Dacca, and Durbhunga cures, through the hides are not in themselves superior, are far preferred. The finest hides of this description are those killed at Agra, Delhi, and Meerut. Much damage is done to the hides by branding on the butts and shoulders.

"Goat and Sheep skins are always obtained green from the local market; goat skins are generally very good, sheep are poor and small.

MATERIALS USED IN TANNING.

Lime is brought into Cawnpore, chiefly from the Banda District, and is used for loosening the hair and flesh of hides and killing the grease. It should be taken in lump unslaked.

Babul bark is obtained locally, the wood being extensively used for firing. The bark season extends from January to June, that is, the spring of the year, when the sap is upon the trees; from six to ten year old trees are the best for bark. The bark should be peeled from the trees immediately after they are cut down. The natives are rather careless in this particular, and greatly injure the bark, for, to get it separated from the wood, they beat it with wooden mallets, and gash it about to get it loose; they can be

it off by hand ; each gash is a wound in the bark through which the tannin escapes. In England a peeling iron is used and long strips of bark are taken off without any beating, but of course this must be done before the sap has dried The tannin is contained in the white or inner stratum of the bark. The tannin is stronger in babul than in oak bark, but the quality is not considered so good.

Experiments tried lately in England by Professor Abel, the Chemist to the War Department, proved *babul* to have keeping qualities quite equal to oak bark, if not superior ; it is thus a valuable tanning agent. But it has more colouring matter, that is, it gives a reddish liquor, and this is somewhat against it, but a great advantage is found from mixing with it, *hurr*, or *bahaira* (the myrobalan of commerce the dried fruit of Terminalia Chebula,) which is plentiful in the market, and is used extensively as a dye. The liquor from the *hurr*, or *hurra*, is a powerful tan, and though it is not reported to be of a quality that would make good leather of itself, it is highly esteemed in England to mix with other tanning agents, owing to the bright colour it imparts, and herein is its usefulness in combination with *babul* The *hurr* is a product of the forest, and is very common, but the natives of Cawnpore use it only as a dye. *Sumatch* is another tanning substance, which has been used in small quantities at this tannery, but only for finishing and imparting colour. It is imported from England and is therefore very expensive

Cutch is a very powerful astringent and rich in tannin. It is the inspissated juice of Acacia Catechu (the *khair* of the forests), and is used by the natives as a dye and is also eaten with *pan* ; its tannin is three or four times stronger than that of oak, but of poor quality ; the leather made of it is of dark colour and does not last well, but tans so quickly and therefore so cheaply, that it is used extensively in England : such leather is believed to be unsuited for wear in this climate. At Cawnpore the Cutch is employed only for darkening colour when that is required.

Divi-Divi is the pod of a shrub that is a native of South America, but grows well in the Madras and Bombay Presidencies ; it is called the Caesalpinia coriaria. The pod is exported from Bombay to England, but in small quantities. The tannin is strong and considered good for mixing with barks. The shrubs were grown at Cawnpore from seed and a plantation of about 6,000 or 7,000 trees is doing well The barks of *Sal*, *Asaina*, and *Amaltas* are known to contain tannin, and experiments are being carried out with them.

The only used for currying is cod-oil ; it is obtained from England, and is the best known for the purpose. Indian fish oil would answer, if more carefully extracted. Mutton or goat tallow is used either alone or mixed with cod oil ; in the latter state, it is called "dubbing," which is applied to all leather intended for harness straps, or like pliable purposes

(To be continued)

Small Trades & Recipes.

TO SWEETEN RANCID BUTTER.

Add 25 to 30 drops of chloride of lime to every 2 lbs. of butter, work the mass up throughly, then wash in plenty of fresh cold water and work out the residual water.

FERTILISER FOR LAWNS.

Ashes strewn on lawns prevent the growth of moss and promote that of the grass. Soot, which is often thrown away, is an excellent fertilizer, particularly for onions, potatoes and all kinds of radishes. Both ashes and soot have the property of keeping away sand fleas and little snails. An excellent fertilizer is obtained by mixing 9 parts of soot with one of common salt

APPETITE PILLS FOR DOGS.

Calamus	12 grams
Sodium sulphate	12 ,,
,, Bicarbonate	4 ,,
Rhubarb	4 ,,

Mix and form into 12 pills, with syrup. Give one pill twice daily.

To kill blue grass growing between bricks around the lawn, wash the bricks with salt water or strong solution of soda

IMITATION SILVER.

Copper	64 parts
Tin	3 ,,

Melt in a crucible and cast into moulds previously oiled.

SUBSTITUTE FOR PLASTER OF PARIS

Best whiting	10 lbs.
Glue	5 ,,
Linseed oil	5 ,,

Heat these materials, and mix them thoroughly. After this compound has cooled, lay on a stone which is covered with powdered whiting, heat until the mass is tough and firm. Cover with wet cloth to keep moist. Ornament and dolls may be made of this material by pressing it into a mould with a screw press. It becomes very hard after a time.

ARTIFICIAL ESSENCE OF PINEAPPLE

Oil of Lemon	2 drams.
Butyric ether	4 ,,
Acetic ether	2 ozs.
Spirit of Nitrous ether	1 oz.
Glycerine	1 ,,
90 p. c. Alcohol	1 pint
Water, enough to make	2 pints

Mix. This is used for flavouring syrups, confectionery, etc.

Imperial syrup is made by mixing equal parts of raspberry and orange syrups.

DIABETIC LEMONADE.

Citric acid	10 grams.
Glycerine	40 to 60 ,,
Water	2,000 c. c

CEMENT FOR CELLULOID.

Shellac	4 parts
Spirit of camphor	6 ,,
Alcohol	8 ,,

Dissolve in a warm place. This glue may be used for fastening celluloid to wood, tin, or other materials. It should be kept well corked. Apply hot.

To clean cane seated chairs wash with a solution of oxalic acid with a brush. Their colour will be restored

POLISHING PASTE FOR METALS.

Take finely powdered rotten stone, sift it through muslin and knead with a sufficient quantity of soft soap to form a stiff paste. To 2 lbs. of this mass add 7 ozs. of oil of turpentine. Put in boxes or form into balls, which will soon become hard.

Reference Directory

Book Binding Machinery.

(1) Charles Beck Paper Co, Ltd., Philadelphia, Pa. (2) Cols Wrench Co., Worcestor, Mass. (3) Fuller Mfg. Co., New Haven, Conn. (4) W O. Hickok Mfg Co, Harrisburg, Pa. (5) M. D. Knowlton & Co., Rochester, N. Y. (6) John T. Robins n Co, Hyde Park, Mass. (7) Seybold Machine Co, Dayton, Ohio. (8) Standard Machinery Co., Mystic, Conn. All of U. S. A.

Artesian well Boring Machinery.

(1) C. Isler & Co., Bear Lane, Southwork, London, S. E. (2) R. D. Batchelor, 72, Queen Victoria St., London E C. (3) Williams Alfred & Co, Artesian Works, Bow, London E (4) Nather & Platt, Salford Iron Works Manchester. (5) J. Henderson & Son Ltd, 22, Paisley Road, Toll, Glasgow.

Bicycle Machinery.

(1) E. W. Bliss Co., Brooklyn, N. Y. (2) Ferracute Machine Co., Bridgeton, N J. (3) Waterbury Farel Loundry & Machine Co. Waterbury, Conn. (4) Blake & Johnson, Waterbury, Conn (5) Pratt & Whitney, Hartford, Conn. (6 Garvin Machine Co, New York. All of U. S A.

Brush Making Machinery.

(1) John Waldron Co., New Brunswick, N. J. (2) Joseph Green & Nephew, Globe Iron Works, Crown Point Road, Leeds. 3) Shaws, Ltd 32 Hanover St., Manchester. (4) H. O. Strong & Co, Norfolk Works, St. Paul's, Bristol. (5) Harrison & Hayton, Welbeck Works, Welbeck St., Ashton-under Lyne.

Candle Making Machinery.

(1) Honchin & Huber, Brooklyn, N. Y., U. S. A. (2) C. E. Rost & Co., Machine Works Dresden, Germany. (3) J. & W. Barlow Rochdale, England. (4) E. Cowles, Hounslow, England.

Paste Board Box Making Machinery.

H. M. P. Catoire & J. A. M. Marret, 10 & 12, Rue des Ardennes, Paris, France.

Carpet Making Machinery.

(1) Hutchison Hollingworth & Co, Ltd., Dobcross Loom Works, Dobcross S.O. York, England. (2) Curtis and Marble Machine Co., Worcester, Mass., U. S. A.

Electroplating Apparatus.

(1) Hansen & Van Winkle Co., New Ark, N. J. (2) Gray & Co, Plating Works, 41, Miami Bldgs, Cincinnati, Ohio. Both of U. S. A.

Corks.

(1) Todd & Pect, Harrow St, Mashalsea Road, Borough, London, S. E. (2) L. Lumley & Co., Ltd., 1 Am. Sq. Minories, London, E. C, (3) F. Wells & Co., Stevens St., Bermondsey, London, E. C. (4) Slingby Bros., Boston, U S. A.

Toys.

(1) Harrods Stores, London, (2) Olney Amsden & Sons, Ltd., 9, 10, 11, Falcon St., London, E C. (3) Fraenkel Bros., 129, 130, 130A, Houndsditch, London. E

Japanese Brushes & Buttons.

Sakabe & Co., 713, Kawasaki, Osaka Japan.

Scientific & Industrial Topics.

A New Use of Shellac.

Gardeners often require a coating for amputated branches and wounds of their valuable trees. Here is a novel method for them. Shellac dissolved in alcohol, forms an excellent coating for amputated branches and for wounds of fruit trees, making a waterproof artificial skin, under which the wood grows until the wound in healed.

Rust Proof Iron.

The rust proof black coating on iron or steel by boiling in a solution 4 ozs of phosphoric acid and 1 oz iron filings in on gallon of water has been tested by immersion for a year in salt water. The metal remained uncorroded, while a similar untreated piece was badly rusted In practice, the iron or steel is first freed from rust and cleaned in hot alkaline solution, and then, after rinsing, it is suspended for 2½ to 3 hours in the above bath, kept at boiling temperature A greenish black colour is imparted which may changed into a pleasing grayish black by rubbing with linseed or paraffin oil.

Etching on Steel Knife Blades.

Etching on steel knife blades can be done by means of a rubber stamp now a days. The surface of the blade is coated with gum guaiacum varnish ; the rubber stamp, coated with a thin layer of potash solution, is then applied, thus removing the varnish, leaving the steel free to be etched by the application of dilute nitric acid. A better method than that by wax

Making Steel Dies.

Making hardened steel dies by etching is the purpose of a German invention. The process consists of making a hard steel die block and then etching it with electrolytic action by bringing it in contact with a Plaster of Paris reverse model of the die. The plaster of Paris is saturated with sal ammoniac, which renders it a conductor. The dynamo used for supplying the current has a capacity of 30 amperes at from 1 to 15 volts, as may be required. It is usually considered that from four or five hours are required for the production of a depth of about 1/16 inch in the die block.

A New Alloy.

"Cupror" is the name of a new metal introduced by an American. This metal, although composed entirely of copper, fails to respond to the usual tests for that metal. It will not oxidise or corrode, and is unaffected by the attacks of hydrochloric acid and sulphuric acid. The colour is similar to that of gold, and it has a permanent lustre. An analysis shows the metal to contain 94.2 p. c. of copper and 5.8 p c of aluminium.

Formulas, Processes, and Answers, Etc.

L. C. D' Nazareth, Poona, writes : Will you kindly let me know the process of cleaning and polishing marble slabs ?

What is the colour of the slabs ? By what means they have been discoloured ? These points are essential, because there are separate methods for different kinds of marbles and for different discolourations. Ointment slabs and greasy mortars are throughly and easily cleaned by rubbing with ordinary newspaper wrung out in hot or cold water. Powdered pumice, 2 ozs ; prepared chalk, 4 ozs. dried carbonate of soda, 2 ozs. Mix

and make into a paste with equal parts of water and glycerine. It is used by rubbing a moist rag on the surface of the paste and then applying to the marble surface, and finally washing off with soap and water. For polishing adopt the method that appeared on p. 273 of Feb. 1914 issue of Industry.

What is Copra Butter.

M. B, Madras writes: What is Copra butter?

Copra butter is obtained from Cocoanuts. Its trade names are vegetaline, nucoline, cocotine, palmin, etc. It is white, almost tasteless, of the consistence of beef suet or mutton tallow, and melts at about 80°F. The better brands of it are said to contain more than 90 p c of vegetable fat and a mere trace of water, whereas ordinary butter contains only 85 of fat and nearly as much as 15 p c. of water. The principle involved in the elimination of the butter from the fresh cold drawn oil of the dry nut (copra) consists in its subjection to various refining processes by which the free acids and other substances in it are separated so as to leave only the fat. The eliminated substances are used in soap making. Copra butter is used as an adulterant of the better grades of butter. It is quite agreeable to the taste. It is cheap (selling at half the price of butter). It is superior for all baking and cooking purposses to lard, tallow and butter itself. It may be used as a substitute for cocao butter. Copra butter, in one form or another, is maunfactured at Silvertown and Liverpool in England, in Marseilles and probably elsewhere in France Belgium, Germany, Jamaica and Pondichery. An article on the subject will appear shortly.

(Owing to want of space we are compelled to leave out many answers in this issue.) Ed. I.

Notices & Reviews.

Parbhoo Lall Brothers' Products.

Parbhoo Lall Bros, Genl. Merchants, Stationers, Commission and Advertising Agents, of Suddar Bazar, Ambala, have kindly sent us the following articles from a numerous other products of their own make: two solution marking ink, blue black stylo ink violet rubber stamp ink, blue black ink powder, thumb impression taking set and ink, plate powder, blancho with sponge in a fancy round zinc pot, and a few cigars (No. 63, Sweet rose No. 1, Silverfoiled; No 94, Queen Specials No. 1, Silver foiled; No. 96, Torpedo shaped No 1; No. 97, Planters' No 1; and No. 98, Black Burma.) We have tried each and every one of the articles and have no hesitation in stating that they are in no way inferier to foreign brands either in the get up or in prices. Public would do well to give them a trial. By the bye, the firm is an old one and have obtained several gold silver and bronze medals and diplomas and certificates of honour at various Industrial Exhibitions. They also sell Frenchchalk, table salt, Madras curry powder, clay pipes, sealing wax, stationery, medicines and other things A wholesale price list can be had on application. We heartily congratulate the firm and wish it a long, useful and prosperous career.

Magic Comb

We have the pleasure to receive a sandal wood Magic Comb from the Prabhakar Agency, Sagar Sole Agents of the Oriental Sandalwood and Ivory Fine Art Works. The comb has a lid, by the opening of which, oil can be poured into it, so that combing and oiling the hair are done in one operation. This is its particular advantage. The article is a nice one and we can heartily recommend the same to the public in these reviving days of indegenous arts and industries. We hope our countrymen will shun foreign things and encourage this really deserving art by patronising. The firm manufactures many articles of every day use and have already obtained several medals and certificates and diplomas of honour at various Industrial Exhibitions. We wish the firm every success.

Reference Catalogue of Books, Etc.

Books on Cycle Construction.

(1) Bicycle Repairing, by S. D. V. Burr, Rs. 3-15. (2) The Modern Safety Bicycle, by H. A. Garrat, Rs. 2-4. (3) Motor Bicycle Building, by P. N. Hasluck, As. 14. (4) Road Rider, As. 14. (5) Modern Cycles, by A. J. Wallis Tayler, Rs. 7-14. (6) Motor Cycles and how to manage them, As. 14.

Journals on Electricity.

(1) Electrician, Weekly, Annual subscription with postage, Rs. 30-8. (2) Indian & Eastern Engineer, Monthly, A. S. Rs. 10. The following are foreign journals :—(3) Electrical Engineer, W., A. S. 8s. 8d. (4) Electrical Review, W., A. S. £1. 10s (5) Electrical Times, W., A. S. 15s. 2d. (6) Electricity, W., A. S. 8s. 8d. (7) Electrical Engineering, W., A. S. 8s. 8d.

Books on Chemical Engineering.

(1) The Elements of Chemical Engineering, by J. Grossmann, Rs. 3-1. (2) Chemistry for Engineers and Manufacturers, by A. G. Bloxam & B. Blount, 2 vols, Rs. 24. (3) A Handbook of Chemical Engineering, by G. E. Davis, 2 vols. Rs. 31-8. (4) Machinery and Apparatus for Mfg. Chemists, by J. Shears, Re. 2-10. (5) Industrial and Mfg. Chemistry, by G. Martin, £1. 1s. net.

Books on Confectionery.

(1) Modern Flour Confectioner, by R, Wells, 2s. (2) Ornamental Confectionery, by R. Wells, 5s. (3) Pastry Cook and Confectioner's Guide, by the same, 2s.

Book on Mineral Water Making Plant.

The Practical Mineral Water Maker, by Bratby & Hinchcliffe Rs. 5 8.

Books on Screw Making.

(1) A Guide to Standard Screw Threads and Twist Drills, by G. Centry, As. 8. (2) Screw Threads and Methods of Producing them, by P. N. Hasluck, Re. 1 2. (3) Turners' Handbook on Screw Cutting, by W. Price. Rs. 3-12. (4) Reed's Screw and Worm Wheel Cutting up to date, Rs. 2-3. (5) Screws and Screw making, Rs. 2-4. (6) Modern Machine Shop Tools, by W. H. Van Dervoort, Rs. 18.

Books on Well Sinking.

1. Artesian Wells as a means of water supply, by W. G. Cox, Rs 3-8. 2, Kazna System of Deep Boring for water as practised in Japan, by F J. Norman, Rs 4. 3. Rudimentary Treatise on Wells and Wells sinking by G. R. Burnell & J. G. Swindell, Re. 1-8 4. Manual of Irrigation Wells, As. 12. 5. Well Boring for water, brine & oil, by C. Isler, Rs. 8-12.

Books on Timber.

1. Indian Trees, by Sir D. Brandis, Rs. 14. 2. The Timber Merchant's and Builder's Companion, by W. Dowsing, Rs. 2-4. 3. The Timber Importer's, Timber merchant's and Builder's Standard Guide, by R. E. Grandy, Re. 1-8. 4. Timbers and How to know them, by Dr. R. Hartig, Re. 1-8, 5. The Practical Timber Merchant, by W. Richardson, Rs. 2-10. 6. The Principal species of wood, by C. H. Snow, Rs. 14. 7. The Timbers of Commerce and their Identification, by H. Stone, Rs 6-10. 8. Manual of Indian Timbers, by J. S. Gamble, Rs. 20.

Journal on Talking Machines.

The Talking Machine News, 2d. each. Published at 1, Mitre Court, Fleet Street, London, E. C.

Journal on Ice Making.

Cold Storage and Ice Trades Review, Published at 3, Oxford Court, Camion St., London, E. C.

Journal on Toys.

The Toy and Fancy Goods Trader, monthly. Published at 150, Fleet St., London, E. C.

Journal on Cinema Business.

The Kinematograph and Lantern Weekly, published at 9 & 11, Tottenham St., London, W. C.

Industry Buyers' and Sellers' Guide.

B. Laksmi Narayan Lal, Pleader, Aurangabad, Dist. Gaya.—For information on plantain fibre and its extractor, write to Mr. J. K Sircar, Fibre Expert and patentee, P. O Sukchar, Dist 24-Prgns.

Pandit Shiv Ram Wali, 3rd. Bridge, Srinagar, Kashmir.—The present market rate of ghee is Rs. 50 to Rs. 53 per maund. Write to S. B. Banerjee, 30, Hari Ghose's Street, P. O. Simla, Calcutta, or to B K. Chatterjee, Bazar Lane, P. O [illegible]arpara, Dist. Hughli.

G. R. Singh & Co., Bezwada,—Write to Burn & C[illegible] Raniganj, for the jars. Wants addresses of firms which deal in Japan made Bamboo Cycles.

R. P. Singha, Patna City.—Wants addresses of some cotton and woolen mills of Japan.

T. R Kerrir, Bhoosa Mandi, Amballa Cantt.—Wants to dispose of a copy of Prof. Sage's Magnetism, Hypnotism etc. for highest offer above Rs. 20

Gunput Singh Late Jailor, Chindwara, C. P.—Wants addresses of firms which manufacture or sell raw camphor.

The Pollachi Cycle Trading Co., 84, Kuchery St., Pollachi.—Wants to dispose of a Lancaster Camera with accessories, all in new condition, on monthly purchase system.

C V. Seshagiri Row & Sons, 182, Sunthapet, Nellore —Wants addresses of firms which sell or manufacture Standard Inverta and Continental lights and mantles, etc , on wholesale rates.

Md. Abdur Razzaque, Desangmukh, Sibsagar, Assam.—Wants to buy a butter making machine. Thanks for your kind appreciation of Industry.

S. M Shafi Kasur, Punjab.—Wants buyers of Japan made rope making machines.

H. Das, Uttarpara, Dist Hughli —Wants buyers of tinboxes and trunks of various sizes and colours.

A. N. David Kharwa Estate, Ajmeer.—Wants buyers of marble of exceptional colours and shades.

The manager, Am. Trading Co., Cotton pet, Bangalor City —Informs S M., Jhang city, that they have two books on embroidery, priced at annas eight each. Informs N. N. Roy. Arhaura, that they undertake to repair the cylinder of his Grisworld Knitting machine.

S. K. Addy, 62, Chetla Road, Alipore, Calcutta.—Wants addresses of exporters of bones and bonemeal. What is the market rate of bones per maund?

T. Khanan Chetty, Trader, Ongole.—Wants buyers of margosa, cucumber and Castor oils.

M. H. P. Ghatalah, Banganapalle.—The addresses of dealers in colour have already appeared. Fly shuffle loom seems to us the best. Kindly write to Mr. Hoogwerf, the principal of the Govt Weaving School, Serampore, Bengal. Can any weaver. who excel in the jacquard and Dobby works, go over to Banganapalle ? Wants buyers of cotton carpets. Wants to buy eggs and seed cocoons of Mulberry worms both univoltine and multivoltine. Which firm is ready to preserve univoltine silkworm seeds in ice factories ? What do you mean by brood lac ? If raw lac, Mr. L.P. Shah, Orderly Bazar, Parrackpore E B. S. R., can supply you same at Rs 15/- to 20/ per maund from his factory. Larger quaunities taken at a time will cost much less.

S. S. Brahmachari Ahraura - Wants to buy (1) wooden shoes with rope soles ; (2) Silken dhoties ; and (3) bronze metal polish. Wants to dispose of a model no 1 Premier cycle with complete accessories. Freight and packing free to any part of India

M. I., Fort. Mysore — Wants buyers of uncut topazes. Any lapidary will undertake to cut the topazes. Try Hamilton & Co., Labhchand Motichand & sons, Jewellers, both of Calcutta.

Manager, Desh Seva Yojna office, Talod, Ahmedabad wants to dispose of (1) oil mill ; (2) Bandsaw ; (3) Two grinding mills of vertical type ; (4) Hacksaw ; (5) Variety woodworker ; (6) Circular saw ; (7) Single Deal Frame ; (8) 26 B. H. P. oil Engine ; (9) Pump ; and (10) Saw Sharpening machine.

Thakur Chand and Hotchand Bros., Old Sukkur.—They can supply (1) Old London and world Directories ; (2) Ice making machines ; (3) Soap making apparatus and stamping moulds ; and (4) new and second hand Harrison Knitting machines. They infrom the querisis that the Gretzner machine Co. Ltd of Durloch will supply them best sewing machines and the Upper Sind Engineering Co., Sukkur, oil mills, oil engines, saw mills, etc.

The Laxmi Trading Co, Botad. - Wants to dispose of (1) Second hand knitting machines of James Foster's make ; (2) one point stitcting machine ; (3) two linking machines. They can supply Bromide enlargements. They are agents of the Dubied Knitting machine.

C. P. Bajpai, Gorakhpur.—Our chemist and botanist can give you information on rare herbs Wants addresses of exporters or buyers of neem seeds on wholesale rates.

P. S Rajam, 120, 2nd. Agraharam, Salem.—Infroms that on receipt of postage stamps for two annas he can send a method of a novel way to sell recipes and small articles. He wants to dispose of (1) a copy of "How to master a mail order business" by Hugh McKena of the Universal mail order Institute of London, (2) Complete set of the Mystries of the Court of London, and (3) a copy of 'Successful money making Enterprise or 53 advertised methods of acquiring wealth.'

N. K. Bezbaruah, Barahapjan.—Wants buyers of tea seeds at cheap rates.

Shadmean and Sons, Gokalpura, Agra.—Wants to buy pucca mother-of-pearls for buttons. Wants buyers, canvassers and agents for their precious stones, mother of pearl and other kinds of buttons, studs and links.

Brief Queries & Answers.

B and Co, Amballa Cantt.—S C. Mukherji & Co, 39-2, Canning St, and Traill & Co, 20, Br, Indian St, are best stationers of Calcutta

A A, Gorakhpur—You and other querists are informed that the Society which sells the new domestic ice machine, is of Paris. As the invention is a new one, perhaps no one has yet imported it into India The present war is hampering us from getting news

H D Rajnagar Court—Messrs Thacker, Spink & Co, of Calcutta can supply you books on anatomy physiology and midwifery

A F. A & Co. Sialkot—The article on boot and shoe polishes in Vol. iv will suit your purpose

S A. R, Pratapgarh Camp—You can get barbed wire from Jessop and Co, of Calcutta and leather belts from Cuthbertson and Harper of Calcutta

B P, Chunar—For a suitable pump and rice huller kindly write to Jessop and Co, of Calcutta

K M B Saharanpur—Which of the recipes on guano you have tried? The books on preserving and canning which have been named in a previous issue will suit your purpose The book you name is not given away gratis now.

L S R, Kamphi—An article on gilding has appeared in Vol I of "Industry" We do not know who exchange gramaphone needles and records. What do you mean by essence of ink?

A K R, Girgaum—Please consult a competent lawyer and the books on patents, the names and prices of which have already appeared

A. T J T R, Belgaum—The address of the writer who recommended the remedy is missing and so we can't give you any definite answer. Scented charcoal powder will remove the stains of betels on the teeth We don't know whether there is any radium solution It may be radium or any of its salts pasted on the hands of the watches and sights of the guns or it may be luminous paint of any kind.

Advocate, Myingyam.—Estimate of a sugar factory on modern principles is given in the Indian Problem solved, by P. R Colah, priced at Rs 3-1 and can be obtained from D. B. Taraporevalla Sons & Co., of Bombay.

M T M, Prome—Wants to know how mouldiness of tea can be prevented? How tea is flavoured? Is there any kind of scented paper which will impart its scent to tea and cigars if packed in it?

Dr. B. S, Ramnagar—Articles on the manufacture of inks and blackings and boot polishes have already appeared in previous volumes of Industry.

S M, Jhang—A book to suit you is the Science of Knitting by E. Tomkins, priced at 12s 6d net and can be obtained from D B. Taraporevalla Sons & Co, of Bombay.

K Das, Chunar—Write to The Times Book Club, Oxford Street, London, for the information required

H V R R, Dharwar—Recipes for tooth powder and articles on inks and rubber stamp inks have already appeared in previous Vols of 'Industry.' Any dealer in aniline colours, whose addresses have already appeared will supply you the dyes

N S, Cocanada—For a suitable oil mill write to Jessop & Co, of Calcutta

R P S, Patna—Write to B K Paul & Co, Bonfield's Lane, Calcutta, for empty phials, corks etc Addresses of curio dealers which have already appeared will suit your purpose

A H, Hyderabad—It is Boric acid The chemicals named can be obtained from Smith, Stanistreet & Co, of Calcutta

K S M, Nadaipur—Write to the manufacturers of ice making machines whose addresses have already appeared

S G, Manjeri—Write to Earnest Lebmann of Manchester, England, for a suitable rope making machine

Y I, Abbottabad—Wants to know how ghee is made from Copra and how to make it odourless

Mr A B Menon Wilson College, Bombay.—Please wait for our next issue, in which the process of tanning leather will appear.

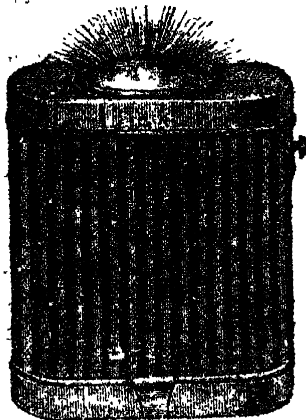
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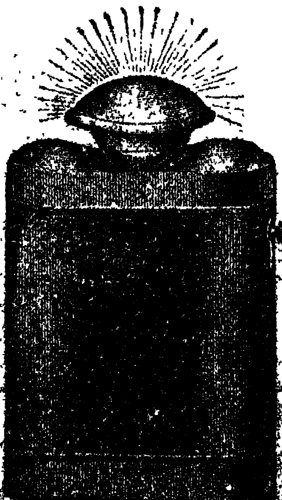
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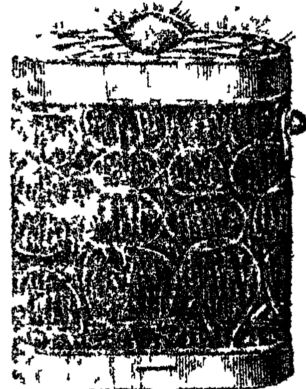


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Automatic Sellers.

(*Communicated.*)

At the present day, it is the tendency of all commercial nations to substitute mechanical apparatus for human labour. The Americans and Germans have achieved much in that direction among others, though the modern system of automatic machines, in the modern sense of the term, arose only about two decades ago.

AUTOMATIC AND SLOT MACHINES.

These machines possess as it were the intelligence of human beings. The nature of performances by these machines are various and varied. Some are intended for amusements, for curiosity, and others for commercial purposes. The demands for these created all over the world are so great that one manufacturer in America had bought into the markets over four hundreds of the same. We shall attempt to describe the nature of a few.

The purpose of the makers of these machines is to sell small but useful articles through them to the public. In order to sell them you require to establish a shop and engage helps to attend to purchases, which had hitherto been the practice, which means so much costs to the shop-keepers. But if you put one or a number of these machines in public places, in market-places, in public parks, in Melas, and introduce the articles into them before-hand and place a card mentioning the nature of the articles to be had by any who shall put a coin in the slot, the machine will hand over the same instantly. If you try to put any other coin, these machines will not respond to you and will decline to deliver anything to you ! The people who want these articles for use or for the sake of curiosity, will be served delightfully and in the same manner as if they are purchasing in a shop. Here the articles are sold to the public, and the traders who put them are relieved from all expenses incidental to the sale of the same !

The profits derived from these and similar machines are considerable. As the sales made through them costs nothing, and the articles are placed within the easy reach of all, the sales accomplished by them are tremendous. In England, America and Germany, to exploit such articles a large number of companies have been formed, and by the outlay of large capital, they purchase hundreds of these machines and over flood whole country with these contrivances.

We shall enumerate some of the articles

vended through them, amongst many. In America and England, all Hotel keepers place a number of them in order to sell wines and spirits to customers. The salary of waiters there, unlike, in India, is very high, by saving their services through these machines, they save a good round sum These machines had proved a salvation to many Hotel-keepers You want a glass of champaigne or beer or brandy, you put the required silver bit, either six pence or a shilling into the slot, and the machine will pour you a glassful of liquid at once, not a drop more not a drop less of the wine! What a blessing to both, to the consumer who is not required to order and to wait, and the hotel keeper to serve personally or by waiter!

If you walk through the streets of London or New York or Berlin, you will find such machines in each bend of the ways for supplying cigarettes or sweets or post cards, at a penny and pickets. The companies which control and own these machines, easily can afford to pay ... per cent dividend to the share holders

Besides the above, similar machines are made to serve, among other hundreds, the following Money Machine, which will change small bits check machine gum vendor peanut vendor, candy vendor strength tester weighing machine die machine, electrical machine, card machine, fortune teller ticket chopper, picture machine, automatic bowling machine lung tester, post card machine and checks

They serve, among others, to entertain the public at the cost of a penny beautiful songs of noted songstress of the stages You put a penny in the slot, the machine will give you first class entertainments by phonographic performances! For the same amount, you will be amused with pictures of celebrated Artists

It was reserved for Germany to construct more astounding kinds of machines, which work automatically like the above the latest inventions, we may mention, made by one firm in Berlin are Indoor shooting range with bullet slot machine, slot machine with six shafts for selling goods, and also oracle slot machine "Cleopatra" As the names imply they are very useful ones and had found a ready sale They have invented one in order to sell Railway Tickets You slip the required amount of fare in the slot, and the ticket you want will be forthcoming instantly What a boon to Railway travellers! If such machines were placed in Indian Railway stations specially the women third class passengers would have been spared lots of troubles and ignomy The sharks which lie in wait at all principal stations to cheat the unwary passengers would have lost that avocation

Another machine, which had proved a boon in Russia is for selling postage stamps In the country of Czar, no stamps can be had on Sunday at any price But these machines are ever ready at all hours and on all days to supply you stamps of any value you want!

The "Egg laying hen" is the great delights of the children You put a coin, and immediately a toy hen will crow loudly and deliver an egg sized sweetmeat! The "wolf" and 'cat" will imitate genuine sound of those animals and deliver goods. There are also makes of varied kinds to sell roulette, soaps and perfumeries.

A most ingenious machine invented is for boiling automatically eggs to the required

temperature. If you want half-boiled or hard boiled, you put simply the eggs, a dozen if you like at a time, to the pot and fix the thermometer accordingly which is a part of the same, and in a few seconds, the work is done !

I advise you readers, who are commercially inclined, but are not blessed with superflous money, to get one or two kinds of these machines and make an experiment with them. I can predict a grand success

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Honey & Bees Wax.

Inspite of the scarcity of bee culture in our country honey is a very plentiful wild product over the greater portion of India There are some bee culture in the hills of the Punjab and in some parts of Burma, where honey is produced of the domesticated bees Otherwise we have four species of bees in wild bees in Madras, similar species in the Central Provinces, as also in other Provinces of India where the honey is collected by crude processes by jungle tribes who are familiar with the localities which the swarms frequent and refuse to leave

Bee culture is extensively carried on in the Murree and Simla Hills in the Punjab

In these valleys, houses—one, two or three stories high—are especially kept for rearing bees,—small recasses, 1 foot by 1 foot by 9 inches, being let in along the walls at 2 feet apart and closed on the outside by a wooden panel in which an entrance hole is made A man is usually in charge of each house, whose duty it is, *first*, to prevent excessive swarming, which is done by giving each colony ample room and sometimes by clipping the wings of the queen bee , *second*, to keep the apiary well stocked with early swarms, and to guard it against the attacks of bears, martins, hornets, wasps, and caterpillars. Stocking is effected by rubbing the inside of the recesses with a paste prepared from honey, white wild rose roots of the Jurinea macrocephala' (*dhup*), "and the petals and seed of the Pleurospermum Govanianum (*espouse*), which is said to be most attractive to the queen bee but as sufficient swarms are not caught in this way, cylindrical boxes formed of two or three lengths of hollow trunks, 2 to 3 feet in circumference, covered at the top, and with an opening on one side, are rubbed with the paste and set out in different places 2 to 3 miles away, in order to catch new swarms, which, when established, are taken to the apiary In Bashahr proper, [illegible]*rrahs* are used instead of boxes Besides these special bee establishments, the Zamindars have places in the lower parts of their houses reserved to the bees, and the boxes are sometimes used as permanent hives It is believed that the [illegible] (the bee domesticated in the district) collects honey and pollen from almost every flower, except the Jessamine [illegible] that the honey from Plectranthus rugosus [illegible] is the best and purest and that after a rainy night, if the bees return laden with honey from the flowers of Pyrus Pashia [illegible], number of them eat it and die but no precaution appears to be taken by the villagers against this happening It is also said that, when the bees have collected honey and pollen from the male catkins of the Deodar, two-thirds of the honey in the comb is quite bitter and useless, and that the honey autumn store is of good quality The honey is taken either at night or in the day time by smoking out the bees, and to induce them to return water is sprinkled about and a noise made by whistling and rapping on brass

... but if this plan does not answer, the ... with the bees which cluster around ... is swept into a cloth or basket and returned to the hive, from which, however, all the combs on the outside of the recesses have been removed, leaving those in the recesses for the support of the bees, and more is left in autumn than in summer. It frequently happens that the bees whose store has failed have to be fed during winter on a mixture of honey and fine buck wheat flour.

"The honey is extracted by squeezing the combs over a fine bamboo sieve, through which the honey drips into a vessel placed below, and the wax is obtained by boiling the comb, and whilst boiling skimming off the wax and further refining it by straining while it is liquid, through a thin cloth. The refuse is about one quarter of the whole and is of no value. The yield of honey from an apiary is from 30 to 50 pucka maunds, and from a single hive 5 seers to 1½ maunds, and from ½ seer to 5 seers of wax. About one fourth of the annual produce is exported, and three fourths consumed by the people."

The system of bee keeping pursued in Kanara, though rudimentary and not extensive, is interesting as forming the only instance of its being even attempted south of the Panjab Himalaya. It is carried on only in some of the small hill villages, and the method is very crude. An empty earthen pot is placed mouth downwards in a white ants' nest, or, more rarely, in a hole made for the purpose, a small opening is made at one side, and the hive, thus completed is left to take its chance of becoming the selected quarters of the of the bees. If bees do come and build, they are left unmolested for some time, after which the comb is extracted as carefully as possible, every endeavour being made not to disturb the parts containing the young. By these means the bees are not frightened and genearlly stay on for a year or two.

The honey thus obtained is principally employed for home medicine.

PREPARATION.—Honey is sold either in the comb, as "comb honey" or as "run honey" after extraction. This is ordinarily accomplished by cutting the covering off the cells, and allowing the honey to flow from the comb into a receptacle beneath or by some method of compression and straining. With improved methods of bee keeping, which have lately greatly developed in Europe and America, it is possible, by a simple adaptation of principle of centrifugal force, to completely empty a comb in a few minutes, without destroying the fine structure of the cells. The empty comb is then returned to the hive to be refilled.

Commercial bees wax is of two principal kinds yellow and white. Yellow commercial wax is obtained by melting the combs after expression of the honey in boiling water. It rises to the surface leaving a great part of the impurities behind, and is either skimmed off or allowed to cool in the form of a cake. This process is repeated till the desired degree of purity is obtained. The addition of nitric acid to the boiling water accelrates the purification. White wax is manufactured from the yellow by boiling it into sheers or ribbons and exposing these to the bleaching action of the sun. By this means the surface of the ribbons are whitened, after which they are again gathered together remelted and again made into ribbons, in order to expose a fresh surface, and this is repeated till the

bleaching is completed. The same result may also be more rapidly effected by treating the wax with sulphuric acid and bichromate of potash, when the liberated chromic acid bleaches the whole mass in a few hours.

FOOD.—Honey is highly appreciated by the natives of many parts of India as an article of food. There seems to be little doubt, however, that certain kinds of honey collected from certain flowers, is more or less poisonous. This fact has long been recognised in India ; thus Ainslie writes of a peculiar dark greenish coloured kind, "which, accord- to the Vytians, cannot be eaten with impunity."

MEDICINE.—Honey forms the basis of several very popular preparations and has long been an important vehicle for other medicines in the Hindu Materia Medica. By Sanskrit writers new honey is considered to be demulcent and laxative while, when more than one year old, it is said to be astringent and demulcent Applied externally it is supposed to be a useful detergent. The Koran also, in the chapter on The Bee, contains the following ; "There proceedeth from their bellies a liquor of various colour, wherein is a medicine for man.' In European medicine, however it is employed only as a flavouring agent in cough mixtures, gargles, confections, and in the preparation of oxymels.

Wax like honey, is supposed to be emollient and demulcent, and the white variety is sometimes prescribed in does of 10 to 20 grs. Its principal value however, is in the preparation of ointments. A useful substitute for lard or simple ointment in India (where the latter is not only objected to from caste and religious principles, but also rapidly becomes rancid) is Ceromel, a mixture of one part of yellow wax and four parts of honey.

DOMESTIC, INDUSTRIAL, AND SACRED USES.—Honey is valued in India as an antiseptic, for the preservation of fruits, and for making cakes, sweetments, &c, which are required to keep for some length of time. A curious adaptation of this property is mentioned by Hooker as employed by the Khasias. He writes, in describing their method of disposing of the dead: "The body is burned, though seldom during the rains, from the difficulty of obtaining a fire ; it is therefore preserved in honey (which is abundant and good) till the dry season, a practice I have read of as prevailling among some tribes in the Malay Penisula." The reader will remember its exitensive employment in ancient Egypt for the same purpose. Honey plays an important part in many of the ceremonial customs of the Hindus. Thus mixed with milk, curds, or clarified butter it is ordered to be given as a respectful offering to a guest or to a bridegroom on his arrival at the door of his bride's father. Honey sipping forms part of the marriage ceremony of certain castes, and honey in the mouth of a newly born male infant.

Yellow wax is employed for polishing floors, and in the manufacture of sealing wax lithographic crayons, and mastics When bleached it is used to make candles, and for modelling figures, flowers, and other objects. It is also employed, by calico-manufactures and dressers, to impart a fine gloss to fabrics.

Bar Soap.

[Owing to the persistent demand for this article, we make no apology for quoting it from a standard authority—Ed I]

The ingredients given are for making about one cwt. of soap at a time 15lbs. tallow, 15 lbs. sal soda, 56 lbs resin, 28 lbs stone lime, 10 lbs palm oil, 56 lbs. soft water Make a caustic lye of the soda and lime by boiling them in the water until the compound is homogeneous

In a second boiler heat the resin, tallow, and palm oil (the addition of the latter gives an agreeable yellow colour to the soap), and stir well until throughly incorporated

Now gradually mix the lye with the melted tallow, etc (both compounds being boiling hot), stirring all the time while adding the lye, and for 15 to 20 minutes after (the exact time can only be determined by actual experience), but do not stir too long or the saponaceous mass will separate again Endeavour to stir the mass so that it does not show streaks of soap and lye here and there, but presents a unifrom appearance

The appratus needed is two boilers which can discharge their contents simultaneously into an iron tank, about 18 in. in depth, and as the contents of both boiling kettles are run into the tank an operator at each side with a long paddle or stirrer should well mix the contents. When the mixture has been sufficiently stirred, leave the mass to settle for some 12 to 24 hours, then, if a clear separation of the soap from the lye underneath has not taken place, sprinkle some common salt not too much, over the surface of the soap and if the latter is fluid enough stir up just sufficiently to allow the salt to mix with it. This will expel all alkaline water from the soap, and permit it to float on the surface of the liquid in a semi-hard mass. After a few hours more, draw off the liquid beneath the soap and allow latter to remain undisturbed until hard enough to cut up

If preferred, instead of doing this, the semifluid mass can be ladled out into wooden moulds or boxes, the insides of which have been moistened with water to prevent the soap adhering and thus when the soap is sufficiently hard it can be cut up into bars in the usual way

Galvanising Metals.

By galvanising is meant merely the application of a coat of zinc which alloys with the surface of the metal to which it is applied Thus the material known as "galvanised iron" is sheet steel (which has superseded iron) on which has been deposited a film of zinc Metal in sheet, galvanised before it is worked up, is treated generally by a method different from that adopted for vessels, utensils etc , but there is no reason why the following process should not be suitable for galvanising both metal in sheet and the articles into which it is formed The success of the process, as in tinning metals depends on the thoroughness with which the metal is cleansed previous to being passed through the molten zinc

The plates or vessels are first immersed in a warm bath of equal parts of sulphuric acid or muriatic acid and water, being afterwards scoured with emery or sand They are now ready for the preparing bath made by mixing together equal parts of saturated solutions of chloride of zinc and chloride of ammonium The metallic bath through which they are next passed is a molten alloy

[illegible] (by weight) of zinc, 106 parts [illegible] 1/3 part of sodium. Throw [illegible] sal ammoniac on the top of the bath, previously skimming off any oxide that might have formed, and immerse the articles, bringing the temperature up to 680°F Remove the articles directly this heat is attained otherwise the zinc will dissolve a portion of the iron. Zinc has a great affinity for iron, and it is a good plan to partly satisfy this by allowing the molten zinc to previously act on a piece of waste iron

Small articles of solid iron or steel are galvanised preferably by the following method. The articles are cleansed in a revolving barrel or tumbling box containing sand, which chafes the iron and removes scale, etc A solution is made by saturating with sheet zinc 10 parts of hydrocloric acid and when the evolution of gas has ceased dissolving in it one part of muriate or sulphate of ammonia

The iron articles are heated and then plunged in this solution for an instant if of the right heat this will dry at once on removal and be covered with crystals

Next prepare a bath of molten zinc as before, removing all oxide and throwing in plenty of sal ammoniac to stop further oxidation Heat the articles, dip them whilst quite dry into the zinc, shake off superfluous metal, and cool in water Small articles may be held in a wrought iron basket when dipping into the zinc

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Preserving Fruit Juices.

The fruit must be sound, ripe, and carefully selected, rotten or impaired portions [illegible] be carefully removed, or the whole [illegible] will be spoiled. The juicy fruits are subjected to considerable pressure, and are crushed and packed into felt or flannel bags A common method by which fruit juices are kept from fermenting is to add salicylic acid or other antiseptics, which will destroy the fermentive germ, or retard its action for a considerable time. About 2 ozs of salicylic acid, previously dissolved in a small quantity of 95% alcohol, to 25 gallons of juice or 40 grains to the gallon, is generally considered the proper proportion A trade secret for preserving the juice is to pour the freshly expressed cold juice into bottles until it reaches the necks and on top of this to pour a little glycerine then the juice will keep unchanged in any season

Probably one of the best methods of preserving fruit juices is to add 15 parts of 95% alcohol to 85 parts juice this causes albumen and mucilaginous matter to be deposited and the juices may then be stored in securely closed bottles, jars or barrels If allowed to remain undisturbed they become perfectly clear, so that further clarification is unnecessary the juice should then be decanted or syphoned off

A good method of clarifying fruit juices is to heat them to nearly 212 F with a small quantity of albumen (white of egg will do), without stirring in an enamelled vessel provided with a close fitting lid the impurities coagulate, and either rise to the top or fall to the bottom and the juice is then filtered through felt or flannel The heat effectively destroys the germs of fermentation, and the subsequent filtration clarifies the juices which should be kept in a cool place, where they will remain unchanged for an indefinite period if properly and carefully prepared Cork should be coated with wax, and if possible the bottle necks should be dipped.

[illegible] disappear.

The Art of Distillation & Essential Oils.—V.

(Continued from page 130)

Oil of Rhodium.—Said to be derived from the wood of species of *Rhodoriza*, very fluid and limpid; pale yellow; soon darkens by age and exposure; tastes bitter and aromatic; has a modified odour of roses. Chiefly used as a substitute for otto of roses in cheap perfumery and to adulterate it. Oil of sandalwood is frequently sold for it. *Prod.* 0.1 to 0.16%.

Otto of Roses.—See an account of it on page 127 of Vol. IV. of Industry. From the petals of *Rosa centifolia* and *Rosa sempervirens* (*damask and musk rose*), principally the first, by saturating the water, by returning it repeatedly on fresh flowers, and then exposing it to a low temperature. Colourless, or nearly so; odour, intense, penetrating, and diffusive, and in a concentrated state far from pleasant, but when dilute very agreeable; taste, bland and sweetish; when pure, it congeals at 80°, and does not remelt until heated to fully 85°F.; 1000 parts of alcohol of 0·806 dissolve only 7 parts of otto at 57°F., and only 33 parts at 72°; sp. gr. 0·832 at 90°, to water 1.000 at 60°F. *Prod.* 100 lbs. of roses yield 2 to 3 dr. According to Dr. Gladstone the sp. gr. is 0.8912 and the power of turning the plane of polarization, −7°. Another authority says 212 lbs. of Provence rose blossom yield 1½ to 2 ozs. of otto. Pure otto of Turkish rose boils at 432°F. and congeals at 58°F., while the Italian otto congeals at 61°F. It consists entirely of Geraniol or Rhodinol. It [illegible] freezing at [illegible] gen." Otto of roses [illegible] ted with the oils of rhodium [illegible] and geranium, and with camphor [illegible] ally with spermaceti, to give the [illegible] compound the usual crystalline [illegible] and with castor oil for increasing [illegible] The following are reliable tests:—(1) [illegible] otto has a *bland, sweet taste*; if it is [illegible] it contains oil of rhodium or sandal wood; if it is pungent, or 'bites' the palate, it contains either oil of geranium or camphor, and probably both; if it imparts an unctuous sensation, it contains spermaceti. (2) Exposed for some hours to the fumes of a small quantity of iodine under a bell glass, [illegible] cold, pure otto *remains white*, and continues so when exposed to the air; an adulterated sample, on the contrary, becomes yellow or brown and afterwards, on exposure to the air, continues to darken in colour, until it becomes of a deep brown or even perfectly black, according to the quantity of foreign oil present. A [illegible] drop may be tested thus. (3) (Guibourt) one or two drops of the suspected oil [illegible] put into a watch-glass; the same number [illegible] drops of concentrated sulphuric [illegible] added, and the two fluids are mixed [illegible] glass rod. All the oils are rendered [illegible] less brown by this proceeding; but [illegible] roses retains the purity of its odour [illegible] geranium acquires a strong and [illegible] odour, which is perfectly [illegible] the odour of the oil of [illegible] and becomes somewhat [illegible] general, it acquires [illegible] that of cubebs [illegible]

Salt Marvels.

NEW METHODS AND DISCOVERIES.

That the salt industry in this country is one of considerable magnitude is evident from the fact that the United Kingdom produces nearly one-eighth of the world's supply. According to the latest available figures, the world's output for twelve months is 16,558,676 tons. The British Empire supplied 3,545,150 tons, of which 1,87?,550 came from the United Kingdom and 1,300,477 from India.

Salt, by the way, is still taxed in British India. Indeed, the revenue from the salt duty comes next in value to that from land and opium. In modern Italy salt, as well as tobacco, is a Government monopoly.

There are three principal sources from which salt is obtained, i.e. salt lakes, the sea, and salt mines. The great Salt Lake in Utah, America, provides a very good quality of salt, but it has to be purified before it is suitable for the table. The world depends for its chief supply on the beds of salt rock underground. The biggest salt mines are in Poland and Austria Hungary, some of which have been worked for hundreds of years, and contain dining rooms, ball rooms, and chapel shown out of the solid salt rock.

BOILING THE BRINE.

Within the last generation a new method has been found of mining the salt. Instead of, as formerly, making shafts down which the men are swung, and up which the salt is raised after being hewn or blasted, the following method is adopted. Holes are bored in the ground, sometimes from 500ft. to 1,200ft in depth until the salt beds are reached. Tubes are then inserted from 9 in to 12in in diameter, and water is sent down to the botton where it dissolves the salt rock forming strong brine. This eventually rises up the tube, whence it is pumped to the surface. If quite saturated it then contains 26 per cent of salt the remaindet being water generally coloured with clay or other impurity.

The brine is then run into salt pans for evaporation. For 200 years at least, until quite recently, only one method was employey for this evaporation. The iron saltpans are from 60ft, to 80ft, long, 30ft broad, and 2½ft deep. Huge fires are lighted at one end of the pans, and flues brought underneath. The brine is boiled, and the water evaporated until the salt falls down to the pan. It is then raked out and laid in heaps to drain, and is then, for many purposes, ready for the market.

PREPARED SALT.

The temperature at which the brine is evaporated determines the quality of the salt crystals. When fine table salt is wanted the boiling is conducted more rapidly, and this makes a finer crystal.

A second type of evaporation pan is what is known as the vacuum pan. The brine instead of being poured into open pans, is run through pipes into large closed boxes, from which the air is, in a great measure, removed much more cheaply.

Formerly the great objection to table salt was that it became damp when exposed to the air. In order to prevent this, salt manufacturers have added a little of something and placed what is known as prepared salt on the market.

The best known of this prepared salt, perhaps, is Cerebos table salt, which was introduced about twenty years ago by Mr. George Weddell, of New castle on-Tyne.

While experimenting with salt for his own family, he discovered a means of removing the damp causing particles, by converting them into phosphates without altering the salt itself. Phosphates, of course, enter in one form or another into every organ of the body, including the brain, and for its supply of those the body depends upon the food. The phosphates naturally present in food, however, are mostly lost in the processes of cooking and preparing and by adding this prepared salt they are in a measure restored to the food, whilst at the same time improving its flavour —*Selected*

Small Trades & Recipes.

It is amazing how we bring up our little ones Their toys are old fashioned, with no new novelties Compare the methods adopted by the Europeans It is no wonder therefore that when they grow up they show neither any aptitude for manual labour nor to scientific and industrial pursuits Their boys and girls are taught, with toys how to build boats, ships submarines, telephone motor cars, engines, ambulances, cabinet and furniture, railway bridges lighthouses, trucks, cranes, guns, barracks, and what not Now, why not teach any of these things to our children? Suppose, give them a set of clock making made easy It consists of parts for fitting together and making a reliable 30 hour alarm clock. Those parts can be manufactured here and so a new industry can be built up The set costs 5s. 6d. in London

What do you do with used Gramaphone needles? We wondered why some of our quenists wanted to sell or exchange them. Why not grind their points on a grinding wheel and make them work again, or why not make stilletos out of them for etching on glass, etc?

Why not open a dyeing shop on a small scale now? Buy a few pigments and start the business You have no need of buying the yellow or slightly orange coloured pigment now The stalks of the flowers of the *Shephali* tree, *Nyctanthes Arbortristis* will give you the pigment It may also be used for making brown boot polish, The *henna* leaves may be utilised also for a light reddish brown shade with the addition of a little catechu

What do you do with bits of sponge or the dirty ones? Why not cleanse them and pack in bottles to make smelling salt bottles? Just pour some strong ammonia and any otto over the sponges and cork them down When they become dry they may again be moistened with ammonia Verily here is a method for making an everlasting smelling bottle

All of you have seen a kind of water plant in tanks pools, jheels and ponds. They produce beautiful bunches of violet coloured flowers Those flowers can be used by flowerstall holders in binding bouquets of scented flowers All have seen, that a stalk or two, if thrown in a pond, will increase in such a manner that it will cover the whole sheet of water in a few days. Why not draw out fibres from these plants, with a fibre extractor and utilise them in making handkerchiefs, etc The fibre is white, soft and silky looking An extractor may be invented also by any ambitious man.

... you sitting idle with your knit... now? Besides knitting socks, can't you knit night caps and comforters for the en... cold season? Why do you import the cheap night caps from foreign countries, when you have every material at your disposal?

A vast quantity of bandages are required for the wounded in the war and as also import business is at a standstill they are also wanted in India Can't you g t the neces saiy cloth from the mi'ls and sterliz th m by boiling with so n ntiseptic in w ter and roll them o a bandage winder? Th y shall have a large sal A wind r costs 7s only in London

Reference Directory.

Bandage Winder

Burgoyne, Burbidges & Co, 16, Coman Street London, England

French Chem s & Dr g st

Ac n le Meilire, Paris Fr c

Art and Christmas Car's

The Howell Art Co, 145, Bl ... Lane, Walthamstow, London, N

Marb'e Specialities & Tiles

(1) Warden & Co, Bombay (2) The Bombay Tile Mart, 21, Bank Street, F rt, Bombay

Bru hes.

Satya Narayan & Sons, Agra

Boot Polish making Machine

W. J. Fraser & Co., Commercial Road ..., London, E.

Leather.

(1) Bloor, Sons & Vyse, 20, Bowling Green Lane Farringdon Road, London, E. C. (2) H Hohnstamn, 21, West Smithfield, Holborn Viaduct, London, E C.

Japanese Book Seller

Maruzen Kabshiki -Kaisha, Nihoubasi, Don Japan

R p & Tw ne Mac ine

T Lumouth & Co, Cross Lane, Salford, England

Lamp urners

Welsbach Co, Ltd 344, Gray's Inn Road, London, W C

Photo Printing Materials.

Keuffel & Esser Co New York U S A

Perfumers' Raw Materials

(1) Antoine Chiris, New York City (2) Dol & Oc..., New York City. Both of U S A

Slotting Machin s

(1) ... & Co Ltd Birmingham (2) ... Salford (3) ... Machine Tool Co, Ltd Luton

Maker of Glass Bott es & Phi ls.

Johnsen & Jorgensen, Ltd, 25 & 27, Farringdon Street, London, E C

Brick Making Machinery

The Henry Martin Brick Machine Manufacturing Co, Lancaster Penn, U S A

Moving Picture Machines

Williams, Brown & Earle, Inc, 918, Chestnut Street, Philadelphia, Penn, U S A

Scientific & Industrial Topics.

To Give a Metallic Surface to Wood.

The wood is first of all treated in a bath of Caustic alkali after which it is submitted to a bath of hyposulphite of Calcium to which Sulphur has been added Finally it is immersed in another bath of acetate of lead. Wood must remain in these baths for several hours. After it is dry, it is capable of receiving a very high polish and has all the appearance of a brilliant metal

To Increase the Growth of Potatoes.

Previous to sowin the "seeds" of potatoes the ground must be kept wet with the following solution for 24 hours —nitre and sulphate of ammonia, of each 6 lbs in 25 gallons of water This procedure is said to increase the growth of potatoes in an amazing manner. Another solution used by growers is made of 2 lbs. of blue vitriol 4 lbs of lime in 25 gallons of water. Why not give these solutions a trial ?

Water Telescope

Here is an ingenious method of making a water telescope at a nominal cost Procure a funnelshaped tube made of tin, about 3½ feet long and 9 in. in diameter at the broadest end. It should be wide enough at the other end to take in the observer's eye, and the inside should be painted black. At the bottom, or wide end a clear thick piece of crystal glass must be inserted with a little lead, in the form of a ring, to weight the tube. When the instrument is immersed in clear water, it is astonishing how many fathoms down the observer can see.

Simple Remedy for Enlarged Spleen & Liver.

That our own indegenous medicines are in no way inferior to foreign drugs may be proved by the fact that the remedy for these diseases is far superior to the foreign ones. A teaspoonful of the juice of the papaw with an equal quantity of sugar to be taken thrice a day. For children, a single drop of the juice with a little sugar will do. Many eminent authorities advocate this drug Chiretta, another indegenous remedy, is also used for those purposes.

Bricks from Saw Dust.

Here is a novel use of saw dust. Bricks may be made out of it and used for building purposes The saw dust must be dried and all the coarse particles and chips separated from it Two bushels of that sawdust, one of cement and five of sharp sand are mixed together Then two bushels of recently slaked lime is added and the whole is incorporated and pressed into suitable moulds.

Curtain Material

The old fashioned mosquito curtain is going to be replaced by a novel variety. Here is a composition from which leaves are made. These leaves are then cut to sizes and stitched or sewed, 75 p. c. of India rubber, 3% of wool dust, 5% pulverised flint stones, 10 p. c amber varnish and 5 p. c. leather waste, to which a little infusorial earth may be added, are being tempered with carbon bisulphide and kneaded into a thick mass. This is afterwards rolled into leaves.

Reference Catalogue of Books, Etc.

Books on Tobacco Curing.

(1) Principles and Practical methods of curing Tobacco. By Garner. Re 1 (2) Tobacco Leaf. By Killebrew and Myrick Rs 8.

Book on Java Sugar.

Cane Sugar and the Process of its manufacture in Java. By Geerligs. Rs 4-6.

Journal on Sugar.

The International Sugar Journal. Monthly. Anunal Subscription with postage Rs 10. To be had of Messers Thacker Spink & Co, of Calcutta.

Books on Glass Manufacture.

(1) Recipes for Flint Glass making. By a Br. Glass master and mixer Rs 10 8 (2) Glass manufacture. By Roscutain. Rs 5-4.

Book on Flour Manufacture.

Flour manufacture. By F. Kick. Translated by H H. P. Powles. £1. 5s.

Books on Laundry.

(1) The Launderer. By D. H. Benjamin Net 12s. (2) Laundry Management 2s.

Books on Mangoes.

(1) The mango in Porto Rico. Bulletin no. 28 of The U.S. Dept. Agri, Bureau Plant Ind. Washington, 1905 By G. N. Collins. (2) The mango Bark Bores. By C. R. Jones. Bulletin no. 20 of the Philippine Islands Bureau of Agriculture. Manilla, 1913. (3) The mango. By P. P. J. Webster. Bulletin no. 15 of The Philippine Islands Bur. Agri. Manilla, 1912. (4) The Mango By G. M. Woodrow. Busley, 1904.

Books on Dates.

(1) Persian Gulf Dates and their Introduction to America. By D. G. Fairchild. Bull no 54 of U. S. Dept. Agric. Bur. Plant Ind. (2) Notes on Date Cultivation in Countries other than India. Fletcher. The Agric. Ledger, 1906, No. 1. Calcutta 1907. (3) Date Varietes and Date Culture in Tunis. By S. H. Kearney. Bull. no. 92 of U. S. Dept. Agric. Washington, 1906 (4) Culture of the Date. By W. G. Klee. U S Dept. Agric Washington 1883. (5) The Date Palm and its Utilization in South Western States. By W. T. Sevingle. (6) Same book. By the same author. Bull. no. 53 of U. S. Dept. Agric. Bur. Plant Ind. Wastington, 1904.

Book on Guava.

The Cultivation of Guavas near Poona, Dharwar and Limbgaon. By L. B. Kulkarni. Bull no. 40 of The Bombay Dept. Agric. Bombay, 1911.

Industry Buyers' & Sellers' Guide.

E. K. L. & Sons, Eklasapuram, Vaniyambadi, N Arcot —Wants to buy single & twisted and also dyed cotton yarns in nos. 10, 12, 14, 20, 30, 40, and upwards regularly.

D.V. Manjrekar, Commisson agent, Chindwara, C. P.—Wants buyers and sellers of used postage stamps. (2) He is ready to teach watch making and repairing by correspondence in the English, Hindi, Marathi and Urdu languages. (3) He will undertake to reply any questions on watches and clocks on receiving sufficient postage stamps. He claims to be a practical watch and clock repairer. The other portion of your letter is advertisement and should go as such.

A. C. Allahabad.—Mukhdeo Narayan Munshi. Swini, Hanumannagar, P. O. Kananli Bazar, Dist Bhagalpur, wants to buy your old copies of Industry.

Supdt. of Industries, Banganapalle.—Wants buyers of cotton yarn waste and silk waste. Wants to buy white Cedar wood, magnetic sand, lard oil, and watch and clock accessories.

L. P. Shah. Lac factory. orderly Bazar, Barrackpore, E. B. S. R.—Wants to buy quart and pint sized empty bottles in large quantities regularly. He can supply all grades of lac.

B. K. Chatterjee, Bazar Lane, Uttarpara, Dist. Hughli.—Wants buyers of ghee and good tooth powder.

L. Pandeya, Shree Bhawan. P.O. Ahraura Dt Mirzapur.—Wants buyers of lac, Catechu myrabolains, ghee, and other forest produce in any quality.

J. C. Panjabi, Bombay bazar, Karachi—Wants to buy secondhand or rebuilt Corona Typewriter.

Roll no. 3558, Kample.—The [illegible] knitting machine will suit your purpose. Wants to buy Lisle yarns, wool, japanese mercerised dyed yarn and artificial dyed silk.

T. K Ramiah, 2 Clive's House, Trichinopoly.—Wants to exchange the Sept. & Dec. 1912, Jan. & Feb. 1913 and June 1914 issues of Industry for those of Dec. 1910, April 1911 and 1913.

K. M. Parmdera & Bros, Multan City.—They can supply an illustrated book on Tailoring in the Gurumukhi Characters. Wants buyers of silver enamelled studs and last copies of 1913-14 of Swedish Chambers of Commerce and British Export Journal, both of London.

Kasshi Nath Tara Chand Kapur & Co, Hiramandi, Lahore.—Wants to buy silken and woollen cut pieces from Bombay and Calcutta firms.

J D. Rai Agency office Kalimpong.—Wants buyers of just plucked Cardamons in any quantity. Re 1-4 & Re 1 2 per seer for order of 1 to 10 seers and Rs 45 & Rs 40 per maund on orders of above 10 seers. Reasonable discount given on order of above 10 maunds. The addresses you want have already appeared.

P. G Prasada Raw Varma, Jeypore, Dist Vizagapatam.—Wants wholesale quotations for Balaclava Cotton Caps. Your previous letter has not reached us, so kindly repeat your query.

[illegible], Processes, and Answers.

[illegible] Ginger.

[illegible] M. C. & Bros., Bellary, writes :—Please state how to preserve ginger.

Put the green ginger regularly, every night and morning for fortnight, into fresh boiling water. Remove the outer skin with a sharp knife, boil it in water, until it is quite soft, and slice it in thin slices Make ready a syrup of 4 lbs of loaf sugar to 2 pints of water, clarify it, and put the ginger into it. Boil until it is clear Requires 14 days

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Fly Paper.

M. A. M K, Secunderabad, writes Please give a recipe for making Fly Paper

Take some linseed oil in a pan Bring it to a boil. Light the oil as well Let it burn for half an hour Put it out by covering Take out a little with a stick and see if it is thick enough If not, burn again for a few minutes. When it will be thick like molasses it is all right Now take some stout brown manilla paper Apply the thick oil with a brush and allow to dry a little It will remain sticky for six months The operation should be carried on out of doors

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Fertilizer for Lichi Trees.

Roll No 489, Dehradun writes : Will you kindly state a formula for a fertilizer for lichi trees ?

The following may be tried with advantage.—Potassium chloride (not chlorate), [illegible] grains; nitre, 15,5[illegible]0 grains, Potasium [illegible]phate, 17,670 grains. This total amount is to be dissolved in a large quantity of cold water and used for two full grown trees. Amount of water is of no consequence. The mixture should be used in a single day and it should be repeated every fortnight before the flowering season.

Tonic for Oxen

A subscriber writes : - Oxen much pull down during the rainy and winter seasons, what shall I give them as tonic ?

The following may be given .—Locust bean meal, 6 cwt Indian meal, 10 cwt : linseed cake meal, 3 cwt., Sulphur 1 qr. 1[illegible] lb, nitre, 1 qr 12lb Salt, 1 qr. 2lb : Fenugreek, 20 lb, gentian, 10 lb , Sulphate of iron, 5 lb aniseed 4 lb, ground ginger, 3lb total [illegible] 1 qr 12 lb, 5 or 6 hand fuls of the above food can be given with the feed once or twice on every other day for a month The materials can be had of R. S Hart Bros, Calcutta They can make up the food also if you like Kindly give name address and roll No please)

Statistics of Linseed and its Oils

S. R Mallady, Cocanada, writes :—Will you let me know what is the total produce of linseed in tons and its value, produced in India and in the world ? How much of this goes abroad and how much is utilised in India ? How much oil is imported and exported and its value ? The figures for the Madras Presidency is required also. If you cannot give the information name the source from which I can obtain it I want this information on the subject for an article for the Andhra Lexicon which is under compilation.

No figures for the import trade is avail-

able for the last year. Kindly consult an article on Linseed pp. 1 – 77 in Vol. Y. of Dr. (Now Sir) George Watt's Dictionary of the Economic Products of India A letter to the Director General of Commercial Intelligence, Calcutta, will bring you the desired information. However, the following notes may be of use to you Linseed represented 90% smaller than in the previous season but 4·2 p. c. greater than the quinquennial (1907-08 to 1911 12) average. In the United Provinces crops were smaller by 40 2 , Behar and Orissa by 17 3%, and Bengal by 4·6% Yet imports into Calcutta by rail and river to end of Ferruary rose from 3·13 to 4·01 million on cwts Owing to the new crop coming down more quickly than last year, Bihar and Orissa sent 48, the United Provinces 32, and Bengal 13 , Rajputana and the Central Provinces also sent much more. The World's linseed crop last season was very large (3 50 million tons), and prices in 1913 ruled lower but steady Calcutta linseed in London fluctuated between 42 s 3d. and 50 s ½d Prices have been maintained by the greater demand for linseed oil, the new hardening process for soft oils including a very much larger consumption of linseed for soap making The average shipping price at Calcutta in the past year was Rs 10 15 11. The United Kingdom absorbed 76% of the linseed exports, an increased demand Germany also took 38% more Holland took 31,993 cwts, an increase of 9%, and Australia again advanced its demand by 28% to 67,211 cwts But all other countries took less and nothing went to Italy. The following are the figures. –To United Kingdom, 3,046,406 cwts. valued at Rs. 2,31.22 lakhs; to Germany, 531,439 cwts. at Rs 45 72 lakhs; to France 2[illegible] cwts at Rs 16.74 lakhs; to Belgium, 60,870 cwts at Rs. 4.62 lakhs; to other countries, [illegible] cwts at Rs 7.59 lakhs. No figures for the United States are available for the year 1913 14, but in 1912-13 she took 77,505 cwts valued at Rs. 8 55 lakhs She is gradually taking less and less every year. For in 1911-12 she took no less than 1,305,219 cwts at Rs 156 96 lakhs, coming next to the figures of the United Kingdom of that year Her average for the 5 years (1907-08 to 1911 12) were 374,408 cwts. at Rs. 43 27 lakhs The figures for the oil were:—average export for the 5 years (1907 08 to 1911 12) were 177,580 gallons at Rs 3.92 lakhs, in 1911 12, 248,920 gallons at Rs. 7 47 lakhs, and in 1913 14 97,7?8 gallons at Rs 2 52 lakhs No separate figures for the Madras Presidency are available Hope this will do.

Good Ink

K. & Co, Bangalore writes:—Kindly give a formula for making ink like that of Stephen's

Kindly consult page 291 of Vol IV of Industry for a recipe like Stephen's. The celebrated chemist Runge, discovered that a dilute solution of the colouring matter of logwood, *Hæmatoxylum campechianum*, to which has been added a small quantity of neutral chromate of potassium, produces a deep black liquid, which remains clear, does not deposit, and may be employed as an ink Perfectly neutral litmus paper is not affected by it, it does not attack pens, it is very cheap, and so easily penetrates writing paper that it cannot be removed by washing even with a sponge—in a word, it has all the properities of an excellent ink

... the ... which leave a ... them. This gelatin- ... defect in this ink, parti- ... one does not know the precise conditions that determine it. Different means have been proposed to prevent this action, the best seems to be that of the addition of carbonate of sodium, recommended by Fottger. To prepare this ink take extract of logwood, 15 parts, water, 1000 parts; crystallised carbonate of sodium, 4 parts; neutral chromate of potassium, 1 part. Dissolve the extract of logwood in 900 parts of water, allow it to deposit, decant, heat to ebullition and add the carbonate of soda; lastly add drop by drop, with constant stirring, a solution of the neutral chromate in 100 parts of water. The ink thus obtained has a fine bluish black colour; it flows well from the pen, and dries readily. The chrome ink powder of Platzer and the acid ink of Poncelot are imitations of the original ink of Runge.

Heel Balls.

R. C. & Bros, Lahore, write: Kindly let us know how heelballs are made.

To make black heel ball take 2 lbs of best beeswax and 3 ozs of suet, and stir in 4 ozs. of ivory black and 3 ozs. lamp black. Then add 2 ozs. of finely powdered best gun arabic and 2 ozs of rock candy. Mix thoroughly and pour into leaden moulds when near- ...

Liquid Glue.

... & Bros, Amballa, writes: will you ... recipe for liquid glue?

... No. 55.

... ozs; sulphate ... Sodium benzoate ... ozs. Mix the dextrine ... and sodium benzoate with ... of water, rubbing to a smooth paste ... glucose and the remainder of the water ... heat the mixture on a water bath with occasional stirring until it has become ... strain if necessary.

Brief Queries & Replies.

The Manager, The American Trading Co., Cottonpet, Bangalore City—Informs M. ..., Masulipatam, that flat and circular Knitting Machines are quite absolutely necessary for knitting all sorts of garments. In flat machines all kinds of garments can be knitted. But socks, stockings etc., can be knitted with a very low progress in flat machines. For these articles a circular machine will be more advantageous. Therefore both the flat and circular machines are necessary to a business man. He also informs K. S. M., Udaipur, that he will undertake to cure infantile paralysis on payment of Rs. 25 in advance.

The Laksmi Trading Co., Potad, Kathiawar.—

(1) Informs K. E. S. R., Kalpathi, Palghat, that they shall be glad to represent him there for Kathiawar and shall also be glad to appoint him as their travelling agent for Dubied Knitting machines and photo enlargements (2) Informs Shobag Singh to correspond with Messers J. & J. Baldwin and Partners, Ltd., Halifax, as they are renowned wool merchants. (3) Informs N. N. Roy, Akhaura that they can undertake to repair the Grisworld knitter and if he is willing they can exchange the same with Foster's whatever may be convenient to him (4) In reply to the query of R. C. Sanghi, Bhaldarpara, they beg to say that they shall be glad to appoint him as their agent for Dubied Knitting machines and Dr. Pierce's Toothache wax on very reasonable terms (5) In response to the query of M. P., Masulipatam they beg to say that the Dubied Knitting Machines are the best ones. Cylindrical as well as flat machines are used for knitting all sorts of goods, but the difference between the two being that circular machines are bound to produce only one size of garment which correspond to the diameter of the machines while flat machines

... very great advantage to of allow ... garments of various sizes from ... machine only. Thus, the following articles can be manufactured on the M. Type Dubied Machine: Socks, ties, stockings, Gloves, drawers, Sweaters, waist coat, caps, Wristlets, Gaiters, Shawls Bathing Costumes, vests, ladies hosiery, head cloths, Coverlets, Sashes, mufflers, jackets, etc., On reply to the query of roll No. 3558 they beg to say the H. Type Dubied Knitting machine will be suitable for making fancy neckties having beautiful designs. The price of the machine would be Rs. 450 (7) The address you and other querists want is Harrods' Ltd, Brompton Road, London; S W Their city offices are at 35, Bread St. & 96, Q. Victoria St., London, E. C. Their Liverpool shipping office address is Royal Liver Bldgs. Pierhead They have branches in Paris, Berlin and Buenos Ayres They have also agencies at Gibraltar, Mauritius, Cape Town, East London, Port Elizabeth, Durban, Hongkong, Liverpool and Southampton. Their Indian representatives are.—King & Co, Bombay; Mackinnon, Mackenzie & Co Karachi; Balmer Lawrie & Co, Calcutta, Mr E. B. Creasy, Colombo, Binny & Co, Madras; and Scott & Co, Rangoon Cheques and Post office or Postal orders should be made payable to "Harrods' Stores, Ltd," and crossed "Barclay & Co, Ltd., not negotiable." Hope this will do.

C. L. N. A, Pali.—(1) See an article on Camphor on page 169 of Vol. IV of Industry. (2) Yes, earthen pots will be sufficient for burning the nuts and shells. Charcoal can also be used as deodorant. It is used as such in the dissecting room. Otto de-rose will do (3) Postage stamps can be sold or exchanged. (4) Tambulbihar imparts a pleasant perfume to the breath and mouth. It also clears the voice. (5) An ordinary glass retort, a condenser and receiver will be sufficient to distil the oil from the lemongrass on a small scale. These can be had from the Bengal Chem. & Pharm. Works, Ltd., Calcutta. (7) There is no separate book on Indian vegetable gums and resins An article will appear. (8) We do not know whether there is any such centre of European or American university in India where Indian students are allowed to appear for any degree.

H. D., Paikpara Road.—(1) It may be that one dram of alkanet root is sufficient for colouring 16 ozs. of oil in 12 hours, but the tinctorial power varies with all samples of the root. (2) Benzoic acid is not used to deodorize the oil but to prevent its rancidity. 10 grs. to the pint will do. (3) Paraffinum liquidum, a colourless, odourless mineral oil is used as base for hair oils but we presume that the ... will be bad. Better consult ... Waldie & Co., Konnagore ... same. (4) Synthetic ottos are manufactured by Heine & Co., of Leipzig, Germany. You can get them from B. K Paul & Co., Bonfield's Lane Calcutta. A few experiments on a small scale may settle the question of quantity to be used. The same firm can supply you beautiful empty phials for hair oils. (5) An article on bleaching and deodorising oils and fats will appear. (6) Ask a competent lawyer for patenting the article (7) The Cawnpore Paper Box Co., will supply you the boxes.

S. K. D, Akhaha.—Consult the addresses given on peges 22 & 129 of Vol IV. of Industry. The 4th and 6th named books on page 69 of Vol. V. will suit your purpose Write to Newel Kishore Press, Lucknow for ice making plant.

The Venus Chemical Works, Calcutta.—An article on snuff has already appeared in May 1914, issue.

N R S, Funeveily.—Wants addresses of firms in France which sell pictorial post cards. (1) Sorry we do not know what has become of A H Perris of Calcutta (3) Write to Bourne & Sheppard Chowringhee Road, Calcutta, for the photos you require.

J. C P., Karachi.—(1) Consult page 174 of Vol IV. of Industry. (2) It would be difficult to compile a list of articles for which licenses are required

S G., Polur.—The ore of cinnabar may be sublimed.

A. P, Katni.—Thus and Frankincense are one and the same thing See an answer on page 200 of Vol. IV under the heading of fumigating rods. It is the olibanum of European commerce.

H D, Harsi.—Send the articles and we shall consider.

S S. R., Kalimpong.—An ordinary indegenous iron foundry will do. Various addresses of glass phial manufacturers have already appeared.

(No name & address), A Subscriber.—Probably fermentation sets in the sweet solution if it is not properly carbonised or charged by carbonic acid gas.

M. K. P., Nadiad.—N. B. C/o Industry may teach you mirror making by correspondence for a small fee.

K. & Co, Mangalore.—Wants to the addresses of dealers in machineries for ... musical instruments.

S C C., Agra.—It is not possible to give ...

[illegible] equivalents of all things. We have a mind to publish a vocabulary each month For wire pulling machine write to Thakurdas, Hotchand & Bros. Sukkur, Sind.

M. R. Ahlowalia, Sudder Bazar, Ambala — He being a regular commercial traveller since last ten years throughout the Punjab and other parts of India, would be glad to take up advertising or order securing business on favourable terms from bonafide and respectable firms of good standing.

H. S. Narielwala, Altamont Road, Cumballa Hill, Bombay. —Requests V. S. S Iyer to communicate with him

N R V. Batala — The Company whose name appeared is of Paris.

Advocate Myingyan —Write to Burn & Co, of Howrah, for a modern brick making plant and its estimates.

S S. Joyhing F. E. —Yes it the ordinary plantain of our country. The juice of the thing is meant there. We can't say authoritatively on the point.

S N P, Calcutta Senate House —The recipes which appear are of the highest quality. We do not look to cheapness but to quality Things of higher quality will sell at higher prices. Have you not seen that some European perfumes of high class sell at even Rs 10 or upwards per phial of - or one ounce? Of course cheapness must not be overlooked and we shall try to give cheap recipes wherever possible Alcohol of any strength will do Yes, aniline colours may be injurious to health if they mix with blood and if they contain traces of arsenic and other poisonous impurities. But in some diseases they are used internally The weight, you speak of is wine measure

R Bros., Cawnpore —Kindly consult the addresses on page 151 of Vol IV of Industry.

N. C. M., Sorah —Yes it is possible to obtain photographs at night by means of magnesium flash light.

N. M C. & Bros, Bellary —Write to D B Taraporevalla Sons & Co, of Bombay, for Fudel's Household Hints, etc

The Punjab Engraving Co, Lahore —Send the article to the Bengal Chem & Pharm Works, Ltd, Calcutta, for analysis

E. K. L. & Sons, Eklasapuram.—The adress of dye merchants have already appeared.

The Shiromani works, Lahore.—Consult the reference directory of this issue.

K. G. Agency, Rajkot —There is no publication to our knowledge which gives a complete list of periodicals and newspapers of India. The list in the Thacker's Indian Directory and in the Indian Telegraph Guide may serve your purpose.

Roll No. 1727, Cawnpore —The toilet soap Prepared from Castor oil alone will not be so good. Our chemist can undertake to experiment for a small fee.

P S D. Budh —Asks if there is any institution or University where palmistry and phrenology are taught. N B. C/o Industry can teach you phrenology by correspondence. (2) Write to Thacker Spink & Co. Calcutta and to D. B Taraporevalla Sons & Co., of Bombay for books on all subjects.

N. S Rama Rao, Triplicane —Kindly communicate with Mukhdeo Narayan Munshi amla, Hanuman Nagar, P. O Kanauli Bazar, Dt Bhagalpur, for postage stamps

U R Rao, Cherrapoonji —The formula was tried by our chemist and was found reliable and good We do not know whether anyone has put it for sale on the market.

Secy, George Library, (Illegible address)— We have not yet seen a paper like INDUSTRY in India

D N Pathak, Talegaon Dabhada —Do you want oil painting or coloured photograph of Swami Vivekananda? A talented artist gold medalist and student of the Government School of Art, Calcutta, can undertake to execute the work

I C Datta, Gold Medal Artist, Bazar Lane, Uttarpara, Dist Hughli —He is ready to execute one guinea paintings.

J D. Rai, Kalimpong —Write to the Director of Joint Stock Companies in Bengal for the information Wants to accept agency for respectable and reliable firms

V C Mahale, Honavar —We have not heard whether betelnut shells are utilized in making cloths

Chief Accountant, National Banking Co, Ltd. Amritsar.—Articles on Button and Candle making will appear in due time.

K. S & Co, Amritsar.—Yes, any of the industries you name can be taken up. But those of stationery and toys will be more suitable.

J C P, Karachi —We do not know whether any one has yet printed any Urdu technical dictionary. A letter to D B. Taraporevalla Sons & Co.. Bombay, will bring you the prospectus and contents of the book We have postponed, the publication of the book for a while for pressure of work.

Calcutta Market.

Calcutta, Sept. 17.

EXCHANGE.

Bank T T	1-3 13 16 to 1-3 27-32	
Bank O D	1-3 7-8	
3 Months' D A	1-4 3/4	5-8
6 " "	1-4 5-16	

BULLION MARKET July 8.

	Rs.
GOLD—	
English Bar—100 (touch) per tola ...	24-1-9
Australian Bar—(100 touch) ...	24-3 0
Sovereign—Victoria Shield, per piece	15-6 0
SILVER—	
English Silver Bar of 17 1/2 dwt better per 100 tollahs ...	75-14

PRODUCE MARKET — Sep. 14

RICE.

Dwadkhani Rice—Rs 6-8 per md.	
Banktulshi	Rs 5-8
Boiled Patna	Rs 5- to 5-4
Ballam	Rs 5 9 to 5-14
Kazla	Rs 4 4 to 4-9

DAL

Moog Dal at Rs 7-8 (For Black kinds)
Yellow at Rs 8 8 to 9 0
Masur Dal at Rs 5-8 per md
Arhar Dal at Rs 5 0 to Rs 5-4 per md

SUGAR DESI

Cane.—Benares Rs 24 0 to 14 8 nominal.
Goor: Rs 6 7 nominal
Date—Dobara no stock
Goor no stock.

SUGAR IMPORTED.

Cossipur first white at nominal.
Small grain at Rs 1-8 per md
Crystal at Rs 1-8
Java I. M. at Rs 9-11 per md

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November.
1914

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Industry People's Ed.

A Monthly Journal of Handiacrafts & Commerce

VOL V. CALCUTTA, NOVEMBER, 1914. NO. 56.

Scientific Agricultural Educated.

The improvement of Agricultural Education in India is now under the consideration of the Imperial Government and one is struck with wonder to see what a large amount of money the authorities are spending for this education Every province is now proud of an agricultural college well equipped with Research Laboratories, museums, Botanic gardens and model farms etc, We hear not very unfrequently that Indian soil is rich in itself and that the Government is spending unnecessarily such a vast amount quite lavishly to ensure not a bit of success but a total failure.

It has been often and often said that there is but a very meagre 'prospect' we naturally fail to catch. If "prospect" of good livelihood in Agricultural training. What is meant by the "prospect" here signifies good employments with fat emoluments in the Agricultural Dept, the training is bound to be quite a failure as Govt. cannot be expected to provide all the trained agriculturists with lucrative appointments. And are 'appointments' then to be the [illegible] of a scientific training ?

Agriculture, well and properly conducted, is as profitable as honourable. Dr. Mann of Poona believes that India has a most splendid agricultural outlook if the future generation of Indian agriculturists can be got to carry on their own agricultural work in an intelligent and well informed manner. For centuries past the Indian agriculturist had been in the habit of plodding on in his own blind and fatalistic manner. Men of intelligence, men of light and leading had been after securing respectable or what they considered as respectable employment gave agriculture a wide berth and felt ashamed to associate with agriculturists, with the result that average agriculturist in this country was left first in utter ignorance and next in abject indigence.

Do not our hearts induce us towards agriculture when we see the grand results of Agriculture in America and Japan ?

Japan is much smaller in extent than Bengal. Most of the track is full of hills but the Japanese Government allots five crores of rupees every year for its agricultural prospects, and in such a small tract they have engaged 310 agriculturists for lecturing to the cultivators, 116 manure examiners, and 20 agricultural chemists

Besides these there are 46 show farms. Do not our hearts throb with joy when we come to know the grand success of plant-breeding? What a wonderful thing the Americans have achieved in the short course of their pursuit of Agriculture?

But why should we not start our farms? Why should we not face the hard labour which an agriculturist, properly speaking, has to undergo? Why should we not employ ourselves on our own lands which are rich in themselves and which, we may be quite allowed to assert, will be much richer if we care to introduce the systems of best agricultural countries on our soils. These are the questions which naturally traverse our mind. To answer all these one is bound to say that the Indian farmer is much handicapped owing to certain disadvantages under which he has been labouring for many generations. The Indian agriculturists, as a class, are heavily handicapped by a general want of information, by lack of capital, and by ignorance of improved methods of cultivation.

The farmer should be educated and informed in his own work by being given such information as would be helpful to him in carrying on his farming operations. Capital should be placed within the easy reach of all by founding co operative credit societies that would give him money at easy and reasonable terms of interest. A farmer with a fair share of modern scientific information of a ready knowledge of the uses of modern scientific appliances will be a valuable asset to his country. Intelligence must guide the hand or the toilsome labour will turn unproductive. India is reputed to have produced many millionaries but it is a disgrace that not a single such millionaire has come forward with a view to improve the agriculture of his land. Many of our youngmen are coming back with the full amount of agricutural education of the western countries but who is getting here co operation, sympathy, and support? Who is being pushed with a modest capital that is required to organise a decent farming? There is not a Zemindar who has engaged an agricultural expert to devise the means for the welfare of his tenants or to improve the existing systems of agriculture. It has been very frequently complained that the farmer in India is most unwilling to learn anything new or to adopt anything improved. Dr. Mann is able to testify from his own acquaintance with Indian farmers that this alleged antipathy to new methods and obstinate conservatism are purely imaginary. "Once convinced," he observes, "that a new method is a *real* improvement and therefore profitable, no farmer is more willing than the Indian farmer to adopt new methods.' In proof of this assertion Dr. Mann cites the interesting fact that there are at present in use in the districts arround Poona no fewer than 5,000 ploughs of European pattern. In one single village in the Sholapur district there are 100 such ploughs at work."

To some extent the backward condition of agriculture in this country, is due to the fact that land-owners of intelligence are rarely met with. Rent is all that they are concerned with and there the relation ceases with the lands or tenants The enlightened land owner, who by his well devised experiments and his readiness to buy improved machineries, has done so much for agriculture in England and Scotland is a rarity in India. Nor have we here a class corres-

ponding to the Scotch lowland farmer who works on his own land but who is an intelligent and respectable member of the middle class. In Bengal if a man invests in a Zemindari, it is done merely with the object of acquiring a rent producing property, and Beldom with any thought of becoming a gentleman farmer. This condition of things will continue until the people realise that the pursuit of agriculture, intelligently undertaken, is an honourable and profitable occupation.

We wonder when we happen to remember the benevolent gift of Mr. Henry Phipps, an American gentleman. Who can here deny the benefit thus afforded to us by his contribution of £30,000 towards the Imperial Research Institute, Pusa. The eyes of our richmen will not open even seeing this great example set by a foreigner. They will deliberately shut their eyes and will be contented with their present income brought about by the blood of the poor ryots.

The improvement of Indian agriculture is vested on three important things. 1, Livestock, 2. Seeds, 3. Methods and Machineries. Mr. Doffs, the late Principal of the Sabour Agricultural College, very wisely remarked that the programme indicated for the agricultural department is to make itself thoroughly acquainted at first hand, with the best local variations, for special purposes, of livestock, seeds, methods of implements, to find out their weak points and to attack each of these separately and in the order of their importance with all the strength available. The improvement of indigenous things lies in the trial of things found. Successful elsewhere with a view to their introduction and adoption. Such trials cannot be satisfactory unless a practical system of agriculture is devised for the purpose, and the profits are compared with those of existing systems and this presupposes again a thorough acquaintance on the part of the agriaculturist with the existing practices. The greatest and most useful function which an Agricultural Department can fulfil is to provide facilities for such experience and experiments as may assist the development of rural industries of all kinds."

Agricultural education becomes defective if the initiative falls in the hands of foreigners of insufficient acquaintance with practical agriculture in India. The provincial colleges should be staffed by such members as are thoroughly conversant with our local systems. One thing should always be borne in mind that only book-learned knowledge is no education at all. Every student of agriculture should perfectly acquaint himself with the fields, with all the operations of the farm under which he has to work during his training. He must study the peculiar conditions prevailing here which are potent factors in the methods to be adopted.

In the course of his address delivered at Lingayat Conference, Dr. Harold Mann, the only person who has a genuine sympathy for the Indian Ryat, declares himself a strong optimist. Pessimism is not in his nature but all the same he cannot help telling anyone and everyone interested in the improvement of Indian Agriculture to be prepared for hard, and perhaps the hardest work in his own chosen line. People in his country have already been grumbling that they have to labour hard for a living in these days, But they will have to labour harder still in the development of agriculture if they want a comparatively easier and free life in other directions.

[illegible] come when our land owners should make up from their long lethargy so it is now left to them to prove wherher the scicntific education is to be fitful on our soil. Every big Zemindar should appoint an agriculturist to look after and to preach agricultural doctrines and to see whether those doctrines are strictly followed or not. Every land proprietor should send his son or ward to some agricultural institution, so that poor ryats under him can avail themselves of his agriculture training in time of of their need and distress. Co-operation is to be extended for the better pursuit of Agriculture. John Stewart Mill has said "A people among whom there is no habit of spontaneous action for a collective interest, who look habitually to their Government to command or to prompt them in all matters of joint concern—who expect to have every thing done for themselves except what can be made an affair of more habit and routine—have their faculties only half developed. their education is defective in one of its most important branches".

To sum up: Agriculture must not be left in the hands of the few ignorant cultivators; men of enducation and scientific training should guide them and should work with them un-gurdgingly; new scientific methods and appliances, *so far as they are suitable for India*, should be introduced. Capital must conquer its provertial shyness and it must be within the easy reach of all; the tenants must be saved from the iron grip of usurers by opening Cooperative credit societies; the Indian preasants must be gradually and imperceptibly educated in matters agricultural and model landlords should come forward to keep in the brodening and general progress of agriculture. To labour *productively*, and to labour productively sceintific training is indispensable. Of all wastes, the most lamentable and deplorable is the waste of labour; for waste of labour means waste of "lives". If greatest good to the greatest number be the object of all arts and sciences, of all discoveries and inventions, then it is true that the best brains of the provinces available in this particular line should take the matter in hand. We are even ready to be led, ler them come and lead us.

D. N. MITTER L. AG.

Cleaning Cinematograph Film.

The emulsion side of a cinematograph film may be cleaned by rubbing it gently with a tuft of Cotton wool, or a piece of soft wash-leather, moistened with methylated spirit. For the celluloid side use a little water instead of spirit. The film should be laid on a level sheet of plate glass supported above an inclined mirror by blocks of wood at each end in order that it may be seen when cleaning is necessary. It is scarcely practicable to waterproof the film except by varnishing, and any ordinary varnish would be liable to crack and get scratched in running through the machine. Dammer varnish might, however, be tried on a short length of film by way of experiment, the film being immersed in this and hung up to dry. To make the varnish dissolve 500 grs. of gun dammar in 10 ozs. of benzole. and filter through filter paper.

Sunflower—A Commercial Possibility.

Sunflowers grow very beautifully, and largely too, in our gardens, but we do not turn our attention to the commercial uses to which it can be turned. The seeds of sunflower contain much oil and this has been taken advantage of in Europe to make the flowers commercially useful. The plant is cultivated in southern Russia for its oil which is used in the manufacture of soap. The blossoms yield a brilliant lasting useful dye. The petals are peculiarly rich in the amorphous resinous substance—the base of the yellow pigment from which they derive their colour. The seeds contain helianthic acid which when treated with hydrochloric acid in a current of hydrogen, are dissolved into glucose and a violet dye. A useful fibre is obtained from the stalks. The leaves and stalks make a valuable manure either directly ploughed in or as a box manure after being used as cattle litter. The stalks are said to be useful as fuel, and to yield potash from their ashes. As an indirect use it is an excellent plant for bees and large quantities of Honey and wax being obtained from the flowers.

Cultivation.—The experimental cultivation of the sun flower in India was first undertaken at Bangalore in 1873, for the purpose of testing its value in the reclamation of marshy land, and its efficiency in removing malaria from swampy districts. This latter virtue had been drawn attention to in a paper presented to the Societe de Therapeutique, which described the wonderful effects obtained by its cultivation in Holland. These experiments, however, proved that the malaria-dispelling virtues, attributed to the plant, did not exist, though the drainage which had to be employed before it would thrive, naturally improved the climate of the district. Having thus begun, the cultivation of the sun flower was continued, up to the end of 1877 with the view of utilising it profitably in the extraction of the oil, and other economic products to be obtained from its seeds, stem, &c. The last official report regarding the result of this continued cultivation, however dated November 1877, contains a resolution by the Government of India, to the effect that pending the receipt of reports on the chemical analysis of the oil, it did not seem necessary to continue the experimental cultivation further. The decision was based on the fact, that the results, [illegible] to that time, proved that the cost of production of the oil did not permit of profitable cultivation. Since the date of this decision, no further efforts seem to have been made.

Yet when the plant is replete with so much commercial possibilities which have been taken advantage of and brought to actuality in Europe, it is well of us to try the plant and the Government should encourage continuance of experiments of so useful a plant.

Besides the possibilities mentioned above the oil obtained by expression from the seeds is the most important product of the sun flower, and is valuable for many purposes. When pure it is said to be equal to olive or almond oil for culinary and table purposes, indeed, it is much used for adulterating these more valuable oils, especially in Russia. The oil obtained from the plants grown at Bangalore, however, was found to be greatly inferior for table purposes. Further, in a report on the subject by the Superintendent of the Experimental Farm, it is

stated that the Madras Railway Company condemned it as an illuminating oil, after a series of trials, since they found that its thinness unfitted it for fast running trains the Superintendent of the Central Jail found that it dried too slowly to be useful in paint, the Ordnance Department found that it answered all the purposes required in the arsenal, but the price at which it was offered was greater than that of the equally good Rangoon oil. It was found also that four times the quantity as compared with castor oil was required for lubricating machinery, thus necessitating extra attention and consequently increased expenditure The author of the article on this subject in *Spons' Encyclopædia* writes: "The chief industrial applications of the oil are for wollen dressing, lighting, and candle and soap making, for the last mentioned purposes it is superior to most oils." In the form of Oil cake it is a valuable food for cattle and poultry

A consideration of the uses of this product, and the attempts which have been made to employ it in India, seems to indicate that it is certainly of value, but that the cost of production by present methods is too great to encourage any hope of its competing as a lubricant, table oil, or illuminating material with other oils of perhaps greater utility, and certainly of lower price It is also doubtful whether it could be exported profitably for other industrial purposes.

Food and Fodder – In Russia the seeds are sold in the streets and eaten as nuts. They are also roasted and used as a substitute for coffee.

They are highly valued for feeding sheep pigs, poultry, pigeons, rabbits, &c, and are considered superior to linseed for cattle. In many parts of Europe, indeed, the plant is cultivated extensively owing to its seeds forming a useful food for domestic animals. The oil-cake also, as already mentioned, is used to feed cattle. The leaves are said to be valuable as fodder for cattle and horses, but Colonel Goddam records the fact that "in Mysore the cattle do not take to them so readily as in Europe."

We shall be glad to hear from our readers if any one among them has ever turned his attention to this and if so with what result.

Date Sugar in Bengal.

SUGGESTIONS FOR IMPROVEMENT.

The following extracts are taken from Memoirs of the Department of Agriculture in India

The amount of date sugar produced in Bengal alone is probably about 100,000 tons worth well over £ ,000 sterling. This industry is a source of profit to a large number of people

The methods of sugar manufacture and refining carried out in the district are very crude and in the author's opinion are capable and worthy of great improvement

It has been shown that even in the present state of the industry, by the regular planting of 350 trees per acre, one can expect as an average nearly 3 tons of gur per acre. This is a much higher yield than could be obtained in the district from Sugarcane.

About the middle of last century a rapid improvement in the methods and machinery employed, took place. Instead of the old destructive axe-cut, holes are carefully drilled into the trees with an auger or bit and closed metal spouts have been substituted for the old wooden spouts. Similarly, tin or galvanised iron pails fitted with covers have gradually taken the place of the rough wooden troughs which formerly caught the

sap. At first the sap was generally carried to the fire in buckets by hand or with a shoulder yoke. But as the scale of operations increased, gathering tanks were introduced and are now used in all but the smallest groves. These are placed at convenient distances throughout the grove. From these pipes are often run through the grove to larger storage tanks or the sugar house.

I.—*Agriculture.*

Cultivation.—Gardens, especially when young, should be well cultivated. They should be kept ploughed up in the hot weather as this will prevent to some extent loss of soil moisture.

Planting.—A regular system of planting should be followed so as to get the optimum number of trees per acre. The author considers that trees may be safely put at distances of 11 feet apart each way, that is, 360 trees per acre.

II.—*Seed Selection.*

It seems probable that much might be done by sowing seed taken from the trees which yield large quantities of rich juice. Since the thickest trees have been observed by us to be largest yielders, this selection should be a simple matter.

III.—*Manufacture of Gur.*

In the manufacture of gur there is room for much improvement. The whole process is an extremely dirty one. The earthen pans are never cleaned from one end of the season to the other. The consequence is that burnt sugar and much dirt and many ferments collect in the pans. A good proportion of the dark colour of date gur must be due to the burnt sugar collecting in the pans. Mr. B. C. Basu carried out some experiments on the use of the iron pans in Jessore in 1892-4 and states that be prepared jaggery of exceedingly fine quality which was capable of producing almost pure white sugar when treated by the centrifugal.

Owing to the fact that the juice is practically neutral in reaction very little loss of sucrose should occur during the boiling process. It certainly seems to the writer that something ought to be done to import iron pans into the district. The real difficulty in introducing them lies in the fact that often such small quantities of juice are boiled by one man that it would not pay him to purchase an iron pan.

IV.—*Methods of Refining.*

The present native method of refining by means of water weed is an exceedingly slow process, but it has the advantage that very little outlay is required. If, however, centrifugals could be introduced the process would be a much quicker one and the turnover would be much better. Mr. B. C. Basu carried out experiments in Jessore in 1893-4 with the centrifugal and obtained good results when he used good quality jaggery. His remarks show that his experiments aroused great interest. He concluded that if centrifugals come into use, the cultivators would soon produce a better quality jaggery.

It would further be a good plan if the people could be introduced to strain their juice through cloth before boiling it down. Numberless pieces of wood, bark and other impurities are to be found in the juice and on boiling these all tend to darken the syrup.

In the meantime the people should be pursuaded to clean out daily the earthen boiling pans which are at present in use. They could be scrubbed clean with water as is done daily in those parts of Jessore district where an eating gur is made from sugar-

cane. The cultivator says he does not clean his pans because after putting water in them they are liable to crack on the fire Yet in the case of boiling the sugarcane juice, when earthen pans are used and cleaned daily with water, the pans seldom crack.

V—System of Collection of Juice

It has been shown that much of the sugar is lost by inversion during the night after the juice has flowed from the tree The dirty state of the carthenware collecting pots must have a good deal to do with the large amount of inversion Earthenware pots in any case would be difficult to clean, and as a matter of fact the pots are never cleaned from one end of the season to the other, the only treatment they receive being that of smoking. It seems to us that it would be much better if cheap metal pails could be substituted for the earthen pots, It would be preferable for the pails to have loosely fitting lids Such pails could easily be cleaned We had occasion in some of our experiments to collect juice in an enamelled vessel The juice so obtained was always of much better quality than that collected in earthenware pots and this can only be ascribed to the more cleanly nature of the enamelled pot

VI.—Carriage of Gur to Refineries

All the gur is taken to the refineries in the native earthen pots It has been explained that in order to get the gur out of the pots the refiners have to break them The result is that the sugar always contains a certain amount of small piece of earthenware. Where European refineries purchase the gur this is a distinct drawback as the piece of earthenware cut the filter bags which are used in the refinery and thus are a source of great trouble Again the earthen pots filled with gur when loaded on a cart are easily broken and it is a common occurrence for a cart thus loaded to upset down a bund, with consequent large loss of sugar. If barrels or metal drums could be introduced in place of these earthen pots those disadvantages would be done away with

VII We have finally to throw out a suggestion which seems to us worthy of experiment Careful enquiries in the district, conducted chiefly by Mr H D. Chatterjee, seem to make it clear that the tappers would sell their juice at 4 to 4½ annas per maund, rather than take the trouble to boil it into gur It seems possible that an enterprising person might find it worth his while to set up in any given centre and buy juice from the surrounding tappers He might fit up say a Hadi process plant capable of dealing with 60 to 100 maund of juice per day and prepare gur This gur should be of much better quality than the ordinary gur of the district and should fetch a much higher place In addition a centrifugal might be fitted up for the purpose of producing white sugar

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Recharging Small Dry Cells.

The small dry cells used for pocket flash lamp do not, as a rule, have a long life, and if refills are obtainable it is cheaper to buy them than to recharge the old cells The old zinc cylinders will probably be found to be badly perforated and eaten away If the old zinc cells are not watertight, new cylinders should be made from thin sheet zinc, soldering the bottom and side seams. Clean the old carbon rods in hot water Make a small bag of thin canvas the length of the carbon rod, and of such a width that when the

carbon rod is inserted in the bag a mixture of crushed carbon and manganese dioxide, in equal parts, can be packed round the carbon rod ⅛ in. deep. Tie the neck of the bag, leaving the top of the carbon rod exposed. Place a piece of glass or cardboard at the bottom of the zinc cylinder, insert the bag centrally and fill up quickly with the following mixture, tamping it well in: To two parts of water add one part of chloride of zinc, and thoroughly mix together; then add three parts of plaster of Paris and use quickly.

Bicycle Overhauling and Repairing.

It is proposed to give a series of articles on fairly simple repairs that may be successfully undertaken by the amateur who possesses a few necessary tools and knowledge to use them.

There are very many repairs to a cycle that a great number of riders would be able to undertake if they knew how to go about them. This article will deal thoroughly with the overhauling of a machine which has been laid by, or which has even been in constant use, but which would be all the better for a thorough overhaul and adjustment for the present season. It is surprising how much better a machine will run after it has been properly cleaned and adjusted, and is without doubt well worth the time expended.

Arranging the Machine.

Place the machine on the stand, or, in the absence of a stand, suspend the machine by a rope to a hook somewhere above. Take off the chain by removing the chain nut and pin, replace the pin and nut in one end of the chain, to prevent it getting lost, and put on one side. It may be as well here to say that a box or tray should be kept to put the loose parts in as they are detached, or when reassembling there may be several parts missing.

Removing the Wheels.

Remove both wheel from the forks, take off the tyres, and hang up for treatment later. Now comes the important part of examination of bearings. This may be thorough or superficial, according to the age and make of the machine. That is to say, supposing the machine was only new last season and by a good maker, it is reasonable to suppose that they should be in good condition and only require cleaning out. On the other hand, if the machine is several seasons old, and the bearings show signs of wear, by much shake or unevenness of running, then it will be decidedly preferable that the overhaul of this part should be thorough, and be taken to pieces for examination.

Cleaning Bearings.

In the former case, should it be deemed advisable to clean the bearings only without taking to pieces, proceed thus: Fill an oil can having a fine point with paraffin, and thoroughly swill out the bearings by squirting the paraffin runs out quite clean. Place the wheels and frame on its side, so that all paraffin may drain out. Then if there is any shake or play in the bearings, take this up, and spin the wheel or bracket, whichever it may be, and listen carefully if there is any "click" to be heard when the bearing is revolved. If so, it is certain that there is a broken or chipped ball, or a bad place in the cone or cup, and that particular bearing should be taken out for examination. The parts must be wiped quite clean, and every ball carefully examined, as well as the cone

and cups. If a chipped, rough, or broken ball is revealed, replace it with a new one, being sure it is of the same diameter. If a bad or unevenly worn cone, cup, or bracket disc is at fault, obtain a new one and replace it.

When spinning the bearing to detect any fault, after it has been cleaned out, a noise may be heard of the balls dropping on one another as they revolve. This is as it should be, and must not be confounded with a "click" caused by a defective bearing.

After cleaning out, all bearings must be lubricated with some good oil. Pure sperm is as good as anything, and much better than some of the oils put up in tins with a fancy name. Many of these are composed of the greater part paraffin, which is no good whatever as a lubricant.

HUBS.

The back hub may in all probability be a two-or-three-speed variety, in which case it is inadvisable to take this to pieces, unless absolutely necessary for some evident fault It is also particularly essential that this part should be properly lubricated with good oil after cleaning. If bearings are taken to pieces, the hub spindles and bracket axle should be tested for truth, as a bearing can never be properly adjusted to run well with a bent axle. These may be tested between the lathe centres, and if found out of truth, chalked whilst spinning between the centres, and knocked true with a mallet or lead or copper hammer, with the spindle resting on a block of hard wood.

CRANKS AND PEDALS.

Examine cranks and pedal pins for being in line, and also the cotter pins. Examine the fork crown and steering tube for any sign of fracture. Take up any play in the steering, by slacking the pin of the steering collar and adjusting the head nut.

CHAIN.

The chain should be brushed of all loose dirt and thoroughly cleaned with paraffin. Do not be content with simply brushing over with paraffin, but get a shallow tin and thoroughly swill the chain in with enough paraffin to just cover the chain. Hang up to drain, and then, using the same tin, or a similar one, place enough Russian tallow in it to just cover the chain when coiled up and the tallow melted. Place in a warm oven or on the hob, so that the tallow may find its way into every link and rivet of the chain. Take the chain out of the tallow when it has cooled somewhat and hang up to drain; but do not hang up whilst it is very hot, or all or nearly all the tallow will drain out A chain treated in this manner will run for a whole season, and keep in splendid running order, and is well worth the trouble of doing.

TESTING WHEELS.

The wheels should be placed in the forks and tested for truth, before the tyres are replaced. To do this, spin the wheel, and by holding a piece of chalk against the side of the rim, it will be seen where the wheel is out of truth. Then tighten the spokes on the opposite side; or if the spokes on the side of the chalk mark are very tight, or the rim is very much out of truth, slacken these first before taking up those on the opposite side. Go steady, and do not overdo it It is seldom that a wheel will be found to be out of truth in the round, unless it has been badly pulled about or badly made in the first place; but should it be found to be much out in the round, chalk the high places whilst spinning the wheel,

after rough truing sidewise, and tighten the spokes equally on both sides under the high places. Should it happen that a wheel is very highly strung and badly out of truth in the round, it is advisable to find out the part of the rim which has been drawn up too tightly, and let this out before taking up the spokes under the high parts. It will be a great help in the absence of proper tools, to fasten a piece of wire across the forks just clear of the rim ; this will show up the low places, where to let out the spokes. If a rim is not out of truth in the round more than $\frac{1}{8}$ in., it is not worth troubling about.

When the wheels are trued, look round the nipple heads inside the rims, and should any of the spoke heads project beyond the nipple, they must be filed off flush, or they will be liable to puncture the air tubes. Should the inside of the rims be rusty, clean off well with emery cloth, and reenamel with some air drying enamel before replacing the tyres. A rusty rim is very injurious to tyres.

TYRES.

The tyre covers and air tubes should now be taken in hand. Go over the covers carefully inside and out, repairing any weak places in the fabric from the inside, and any cuts in the tread with suitable tyres stopping. The valves of the air tubes should be taken to pieces, and the valve rubbers replaced if perished or stuck to the valve part. Before filling new valve rubbers thoroughly clean the stem and seating, and rub well with French chalk, to prevent sticking. Inflate the tube, and test in water for any leak. Dry the tube, and rub well all over with French chalk before refitting to the rims.

A dressing with castor-oil given to the underside of the saddle will make it supple and prolong its life.

Examine the brake fittings and connections, fitting new brake blocks if necessary.

HANDLES

The handle grips should be examined, and if found loose, removed and refixed. To do this, warm the handle bar end in the gas. and melt a little solid tyre cement into the grip and push home. Care must be taken not to get the handlebar end too hot, especially if the grips are of celluloid or fitted with celluloid tips or ferrules, or they will be spoilt. Any superflous cement which may show on the handle bar may be wiped off whilst still hot with a paraffin rag.

When adjusting the wheels and bracket, do so before replacing the chain, and the best way is to tighten up the cone rather to tight and slack back a trifle until the wheel or bracket will oscillate without any perceptable side shake. When adjusting the chain, see that the back wheel is quite true in the forks both at the bottom and top, and have the chain so adjusted that there is a slight sag at both the top and bottom.

(To be continued.)

How Hypodermic Tablets are Made.

When the occasion arrives for prompt medication the physician congratulates himself if he has hypodermic tablets which he can depend upon. Their failure means his faliure ; and tablets for hypodermic administration; to be reliable, must possess qualifications that are not required, to the same degree at least, in those for oral use. Hence

the manufacture of hypodermic tablets imposes a load of responsibility. Being intended for emergencies and usually of very powerful drugs, the utmost care must be taken to make every single tablet absolutety trustworthy.

In the making of hypodermic tablets the ingredient or ingredients which the formula calls for are weighed out in the drug and chemical department, and reweighed and checked by two experienced pharmacists, who work independently, one acting as a check upon the other, thus minimising the possibility of error. But to be trebly sure the ingredients, which are next transferred to compartments and there kept under lock and key to ensure against mishap, are weighed and checked again just preparatory to the moulding process.

The components of a tablet are first pulverised to a proper degree of fineness and intimately mixed with the diluent, which in every case is a high grade of sugar of milk. This procedure must be through to make sure that the highly active components are equally distributed in the diluent, and subsequently in the finished tablet. The pulverised material in a mortar close at hand, is moistened and worked into a paste, which is rubbed with a spatula into the apertures of metal moulds. This is done upon glass covered tables protected on three sides and above by glass. and provided with ventilating flues. The operator, who is usually a woman, is required to keep her working utensils and her own person serupulously clean. The hands, however, never actually touch the product, for after emerging from the moulds the tablets are enclosed in vials by means of machine which fills 4000 vials, each one of them with 25 tablets, in 24 hours.

Small Trades & Recipes.

FRUIT PRESERVATION.

At a time when the price of sugar is very higher a pronouncement to the effect that fruit can be preserved with sugar, is worthy the full investigation of fruit growers. It is said that fruit can be preserved without sugar either by heating or by steaming it in bottles and then sealing with air-tight lids. The idea is simply to destroy living germs and prevent the access of air. The fruit must first be sound and ripe, and packed in bottles with boiled water. The heat applied must never reach the boiling point, and be slowly applied. In this way it is declared that fruit can be preserved for years, with its natural flavour retained and free from preservatives. These methods are chiefly recomended for the small fruit grown, but it is pointed out that it would be much better if some co operation could take place between fruit-growers and jam manufacturers to provide the public with cheap sterilised fruit which would last indefinitely. Unless some such methodsare adopted at home and probably in many other fruit-growing country, large quantities of fruit must rot upon the trees.—"Capital."

Lemon and Lime juices have stopped the ravages of scurvy and other diseases in the army and in the navy. But they freeze in the colder regions of the earth and hence much difficulty arises for their use. Can't you find out a process for making lozenges and jujubs with the juices? This will go a great way to solve the problem and in the meantime a new industry will come into being.

In its natural state wood contains no sugar, but when sawdust has been subjected in closed retorts to digestion with a weak sulphurous acid solution under a pressure of six to seven atmospheres a remarkable transmutation takes place, as much as 25 p. c. of the material being converted into sugar. In this, we have a very valuable feeding stuff for horses cattle and sheep. The animals gain weight and become more fit and hard for work. When the fodder question is troubling us, why not the owners sandmills try to utilize their sawdust?

We wonder why so much of our native or indigenous oysters of tanks, ponds, jheels, and streams lay in heaps? Why don't you cleanse them and cut out buttons of any size? The material is simply inexhaustible and any ambitious man may make money out of them. By the bye, there are, in India, 58 kinds of wood, gum, resins, seeds, fruits, etc, which can be utilized for making buttons, beads, rosaries, garlands etc, and yet no one cares for them.

Those who live near jungles must have seen the Pales (Butea frondosa) keddu, and tendoo trees. Why don't you collect their leaves and sell them? They are largely bought by indigenous *biri* makers. They are used as wrappers of *biris*. It costs you nothing and yet you can make money out of this job.

In view of the present war in Europe a large quantity of boric cotton is required for the wounded there and as the import business is at a standstill, the price of the same here is going up day by day. Why don't you make them here? It is merely absorbent cotton passed through a tinted hot saturated solution of boric acid and nothing else.

Now, you may naturally ask how to make absorbent cotton? Well, boil best quality of cotton with a 5% solution of caustic soda or potash for half an hour. Wash thoroughly and press out all water as far as possible, and immerse in a 5% solution of chloride of lime for 15 or 20 minutes; wash with a little water, then with water acidulated with hydrochloric acid, then with water. Boil once more for 15 minutes with caustic soda solution and wash with acidulated and plain water as before.

Reference Directory.

(Japan.)

(Owing to continued enquiries regarding Japanese merchants and manufacturers, we devote this section of this issue to them only.—Ed. I.)

Aluminium Ware.

Mr. Takichi Hashimoto, M. P. Manufacturer, Tokyo.

Artificial Silk

Mr. Isao Arakawa, Proprietor, Arakawa Artificial Silken Hemp Works, Tokyo.

Coal.

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(1) Mr. Yoshijiro Kawai, Director, Ojo Coal Mining Co., Ltd., Tokyo. (2) Mr. Kohachiro Tannaka Director, Oyubari Coal Mining Co., Ltd., Tokyo. (3) Mr. Michizo Ushioda, Director, Ishikari Coal Mining Co., Ltd. Hokkaido.

Coffee Importer.

Mr. Rio Mizuno, Tokyo.

Commission Merchant.

Mr. W. Assomul, Yokohama.

Connoisseur.

Mr. Hiromachi Shugyo Tokyo.

Cotton.

Mr. Matazokita, Managing Director, Nippon cotton Cotton Co., Ltd., Osaka.

Diving Contractor.

Mr Reizo Yamashina, Proprietor, Yamashina Kogyo-sho, Tokyo, Member, Tokyo Chamber of Commerce.

Draper.

Mr. Ichitaro Abe, Osaka.

Dyeing Works.

Mr Senzo Nakayama, Proprietor, Nakayama Dyeing Works, Tokyo.

Emigration Agent.

Mr. Jumpei Matsui, Tokyo

Exporters & Importers.

(1) Mr. Kichisaburo Hidika, Proprietor, Nichi Doku Shokai, Tokyo. (2) Mr. Kokichi Bessho, Proprietor, Bessho Shokai, Kobe. 3) Mr. Masataro Ejiri Proprietor, Ejiri Shoten, Yokohama. (4) Mr. Daigoro Go, Director, Taihoi Rumiai, Tokyo (5) Mr Tomitaro Hara, Proprietor, Hara Shokai, Yakohama (6) Mr Jiro Nakano, Proprietor, Daiwa Shokoi, Tokyo (7) Mr. Genjiro Nozawo, Proprietor, Nozawa Gumi, Tokyo. (8) Nozawa Gumi, Yokohama. (9) Mr. Kyujiro Okazaki, M. P., Proprietor, Nichi Bei Shokai, Tokyo. (10) Mr. Ryu Omoto, Proprietor Kyoshinsha, Tokyo. (11) Mr. Naojiro Saito, Proprietor, Dojun Yoko, Osaka. (12) Mr Tasuke Takasu, Tokyo. (13) Mr. Akizo Tokenaka, Tokyo. (14) Mr. Shinkichi Tamura, Proprieror, Tamura Shokai, Kobe. (15) Mr. Sajiro Tate shi, Proprietor, Tateishi Shokai Tokyo. (16) Mr. Takenosuke Yuasa Proprietor, Yousa Shoten, Kobe. (17) Nosawa & Co 57, Main Street, Yokohama. This firm is a very old and reliable one. Their principal exports are: silk piece goods, silk handkerchiefs silk shawls, silk mufflers, silk sarongs, spun silk, cotton yarn, cotton piece goods Hosiery, Hats and caps, Leather, Ginger, Capsicum, straw boards matches, copper, camphor, cement, chemical, oils, canned provisions, machinery Rickshaws Enamelled ware utensils clocks, paper, paper fancy good, and toys and their principal imports are Pig iron, Pig lead, steel, machinery, ammunition, Lumber, chemicals, sugar, paper, Live stock, soft goods, Rice and other cereals, skins, Fertilizers, Hemp, Copra, lac and gunny bags.

Fishery Agent.

Mr Kenko Honjo, Tokyo.

Gas Mantle.

Mr. Keiloku Yamada, President, Osaka Gas Mautle Co., Ltd, Osaka.

Gum

Mr. Tadahiro Tasaki, Managing Partner, Mitalsuchi Gum Manufacturing Co., Tokyo.

Habutae.

Mr. Yugoro Koseki, Managing Director, Habutae Selling & Buying Guild, Sendai.

Hosiery merchants.

(1) Mr. Eizaburo Sugihara, Proprietor, Sugihara Shokai, Tokyo. (2) Mr. Taketaro Yoshizumi, Tokyo.

Inquiry Offices.

(1) H. E. Count Shigenobu Okuma, President, the Indo-Japanese Association, 3,

Itchome, Yurakucho, Kojimachi, Tokyo. (2) Mr. Unosuke Horii, Director, Tokyo Inquiry Association, Tokyo.

Jewellers.

(1) Mr. Kingoro Ezawa, Proprietor, Tenshodo, 16, 17,18 and 19, Owaricho nichome, Kyobashi ku, Tokyo. Importers, manufacturers, and dealers in Diamonds, watches, clocks, Talking machines, Jewellery, Optical goods, and artistic Productions in Precious metals and stones. (2 Mr Kamekichi Yamazaki, Proprietor, Shimizu Shoten, 12, Shichome. Bakurocho, Nihombashi, Tokyo. Manufacturing Jewellers and wholesale dealers in Jewel ornaments, silverware, gold and platinum watch cases, medals, Badges, cups and saucers, etc

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Match Exporter.

Mr. Kametaro Doi, Osaka

Mining Agents.

(1) Mr. Eiji Omiya, Tokyo. (2) Mr. Masayoshi Oshikawa, Tokyo.

Paper, Stout.

Mr. Takichi Oishi, Proprietor, Stout Paper Manufactory, Sendai.

Patents, Solicitors of.

Mr. Kiyomichi Seshimo, J. D, D C. L., Attorney-at Law, Tokyo.

Petroleum.

The Rising Sun Petroleum Co, Ltd., 58, Yamashitacho Yokohama.

Publishers & Printers.

(1) Mr. Seki Hoshino, M. P., President, Tokyo Printing Co., Ltd., Tokyo. (2) Mr. Isami Ishii, Manager, Jitsugyono [illegible] Publishing Co., Tokyo. (3) Mr. Yoshio Sugiyama, Managing Director, Shueisha Printing Co., Ltd , Tokyo.

Reeling Factory.

Mr Taizo Morita, Proprietor, Morita Reeling Factory, Tokyo.

Silk Exporter.

Mr. Kaichiro Sowa, Proprietor, Sowa Shoten, Tokyo.

Silk Tissue Merchant.

(1) Mr. Kuchirro Kamiyama, Yokohama (2) Mr. Hisaki Toyota, Taishoji, Ishikawa.

Silk Merchant.

Mr. Yasujiro Isobe, Proprietor, Isobeshokai, Yokohama.

Spinning Mills.

(1) Mr. Fusajiro Abe, Managing Director, Osaka Spinning Mill Co., Ltd., Osaka. (2) Mr. Teashichi Ito President, Miye Cotton Sppinning Mill Co, Nagoya. (3) Mr. Rikichi Komuro. Director, Sakai pinning Mill Co , Ltd., Osaka. (4) Mr. Sanji Muto Managing Director, Kanegafuchi Spinning Mill Co, Ltd., Kobe. (5) Mr. Takeo Takimura, Director, Asahi Spinning Co., Ltd., Osaka. (6) Mr Toyoharu Wada, Managing Director, Fuzi Gas Yarn Spinning Mill Co., Ltd., Tokyo

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Sugar Merchant.

Mr. Katsutaro Kitagaito, Tokyo.

Sugar Refinery.

Mr. Taiji Arai, Member, House of Peers, and President, Ensuiko Sugar Refining Co., Ltd., Taiwan.

Textiles.

(1) Mr. Harutaro Iizuka, Proprietor, Textile Factory, Gumma. (2) Mr. Shohei Ikeda, Proprietor, Textile Factory, Niigata. (3) Mr, Yasutaro Yamaguchi, Proprietor, Textile Works, Tochigi.

Watches & Clocks.

Mr. K. Hattori, Proprieror, The Seikosha Watch and Clock Factory, Ginza Shichome, Tokyo.

Reference Catalogue of Books.

Journal on Toys.

The Fancy Goods, Games and Toy Trades Journal, published at 57, Ludgate Hill, London, E. C.

Journal on Cinema Business

Bioscope, a weekly, published at 31 to 35 Litchfield St London, E C

Journal on Carriage

The Carriage, monthly, published at 1,010, Arch St, Philadelphia, U. S A

Journal on Machinery

The Machinery Market, weekly, published at Wardrobe Chambers, Queen Victoria Street, London, E C

Book on Sweetmeats

The Manufacture of Preserved Foods and Sweetmeats, published at 7s. 9d, by Scott, Greenwood and Son the Broadway, Ludgate Hill, London, E. C.

Book on Firework

Firework Making, published at 3s. 6d., by Chatto & Windus, W. G Foyle, 135, Charing Cross Road, London, W C. will supply the same.

The Exporters' Directory of Japan.

Imperial Commercial Museum. Department for Agriculture and Commerce, Tokyo, Japan

Book on Lacquard Designing.

The Lacquard Machine Analysed and Explained, by E. A. Posselt, Rs. 15.

Book on Laundry

The Practical Dry Cleaner, etc, by W. T. Branut. Rs. 12

Book on Tanning

Practical Tanning, by L A, Flemming, Rs 30

Book on Dyeing

The Secrets of the Art of Dyeing Wool, Cotton and Linen, by E C. Haserick, Rs 10

Books on Sexual Science

1 The Determination of Sex, by Dr Leopold Schenk, Rs 6 (2) Diseases of Men, by B Macfadden, Rs 3-0 (3) Education and Race Regeneration, by the Rt Hon Sir John E Gorst, As 8 (4) Esoteric Anthropology, by Dr. T. L. Nicholas, Rs 4 6 (5) The Functions and Disorders of the Reproductiv Organs in Childhood, etc, by Dr W. Acton, Rs. 10-8 (6) The Methods of Race Regeneration, by Dr C W Saleeby, As 8 (7) The Origin of Life and Process of Reproduction, by Dr F Hollick, Rs. 12 (8) The Psychology of Sex, by Dr H. Ellis, 6 vols Rs. 54 (9) Sex Education, by Dr I S Wile, Rs 2 3 (10) Sex Enlightenment, by A G Rs 4-6. (11) The Sexual Disabilities of Man and their Treatment, by Dr. A. Cooper, Rs. 4-6. (12) The Sexual Life of our time in its relation to Modern Civilization by Dr. J. Bloch, Rs. 18 6

Industry Buyers' & Sellers' Guide.

K S Mehta, Sonaseri, Udaipur City.—Wants to buy leather and implements for manufacturing boots and shoes, trimmings, and dentists' materials.

D. M. K Hubli —For tabloid making machines kindly write to Burgoyne, Burbridges & Co 16, Coleman Street, London, England.

P S Rajam, 120, 2nd Agraharam, Salem.—Informs that on receipt of postage stamps for four annas, he is prepared to give a receipe for neuralgia, rheumatism, tooth ache, etc

The Imperial Ghee Supplying Co, 4121, Manekchok, Ahmedabad.—Informs Pandit S R W, Srinagar and the public in general that they export best and purest ghee at the current market rates

The Coromandal Perfume Works, Rajahmundry.—For Kanauj Scents, please write to Indra Narain Misra, Otto Merchant, Kanauj City Wants to buy amber

R. J. Sahardya —Aditwari, Nagpur —Wants good tobacco leaves for manufacturing biris.

Bah Tin, 37, Merchant Street, Prome, Lower Burma.—Wants buyers and agents of high class cigars Why not consult Thacker's Indian Directory for your requirements ?

The Darpan Bepopar Co, Cawnpore —Informs R. Bros., Bareilly and the public in general that they can supply tin boxes of any size and shape.

Sukhraj Vyas, Forest Training School, Balaghat.—Wants to sell the following articles ;—(1) Fox (visible) Typewriter at Rs 360 ; (2) Bennett (Travellers') Typewriter at Rs 75. (3) Handpower chaff cutting machine at Rs. 100 (4) Hair oils prepared according to the formulas given in the INDUSTRY, 7 varieties at Re. 1 each per phial. Wants to buy a copy of Forest Flora by Upendra Lall Kanjilal.

The Tirhut Button Factory, Mehsi, Dt. Champaran —Wants to buy (1) Mother of pearl, (2) bones of the fish round the ears, (3) and Cocoanut Shells and indegenous Oyster shells. Wants to know how the buttons of various colours are polished ? B. C/o Industry can give you information on vegetable ivory, etc, for a small fee. Wants buyers and agents of pure lemon juice.

C Bhan Dhingra, Multan City.—Wants the address of Jagannath Nahan who sells Brehemi buti Wants to buy surgical instruments from Indian manufacturers

K M Parmdeva & Bros, Multan City.—Wants buyers of bones at Rs. 2 per maund.

Sawan Mall Jhang City —Wants to sell a Durbar Auto Knitter with 2 pounds of wool at Rs 95, or is willing to exchange with that of anyother make

A, N. N Bombay —Wants to buy Kaolin and Magnesite, (kindly give your full name and address or your Roll No)

Krishna Das, Chunar —Wants to dispose of the Proceedings and journals of the Asiatic Society of Bengal for twenty years (1889-1908)

"Needy" C/o Industry —Wants to dispose of a full set of Sir George Watt's Dictionary of the Economic Products of India, 10 vols but 2nd and 3rd vols are missing. Original price, Rs. 275. what offers ? or can any one supply the missing vols and at what price ?

T. R. Kerrir, Bhoosa Mandi, Ambala Cantt.—Wants to dispose off (1) art of soap

making by Alex. Watt; (2) How to develop Psychic powers; (3) Personal Magnetism; (4) Seances in Hypnotism and how to produce them; (5) A Higher Course of Hypnotism; (6) How to do more business; and (7) Letters that bring business.

'Honesty,' C/o Industry.—Wants to dispose off a collection of 1000 best formulas on various subjects for Rs. 25, one fourth of which are experimented. The sum is wanted for starting an industry by a poor man.

S. C Barooah, P. O. Laiamkuri, Dibrugarh Assam.—Wants agencies and sub-agencies of any description for Dibrugarh district.

Accountant, Cawnpore Flour Mills Co., Cawnpore. Kindly write to Mr Thos. A. Palmer, F L. A. A. (Lond.), authorized auditor of companies' accounts and Principal of the Calcutta Accountancy Institute, 5, Old Court House Street, Calcutta, for requirements, mentioning INDUSTRY.

Biseswar Sahai, Pleader, Barabazar, Hazaribagh.—Wants to dispose of Silk cotton and one Durbar Auto Knitter with extra needles and other accessories at Rs. 120 Kindly communicate with N. B C/o Industry for information regarding dyeing any kind of stuff.

Shrinarayan Sharma, Tonk, Rajputana.—Informs the public that he is ready to give away pills for piles gratis for a few days

A. R. Sahijpaul & Sons, Amritsar.—Wants to buy cane for weaving chairs. Why not write to F. Westbury & Son, 183, Great Dover St., London, S. E., and to J. J. Plater & Sons, 26, Bradford Street, Birmingham, mentioning Industry?

Match Expert.—Querists are requested to communicate with Mr Charles Meyer, consulting Engineer and Expert for Match making, 10, Belvedere Road, Alipore, Calcutta, for information and advice on match factories. He is the match expert of the Baden Engineering Works and their sole representative for India, Burma, and Ceylon and have studied these countries very carefully regarding this industry.

Rustumji Furdoorji Pratabgarh, Malwa.—Kindly communicate with H. C/o Industry, the writer of the article, for your requirements,

Kaka Singh & Co, Amritsar.—Why not make envelops, perfumeries, Sealing wax, inks boot polishes, etc,

---

Formulas, Processes, & Answers.

Essence of Coffee

D P Rao, Bellary, writes:—Will you kindly let me know the formula for preparing essence of Coffee?

Take ground roasted coffee, 2 to 8 ozs, bruised cinnamon, 60 grs, sliced vanilla, 60 grs, diluted alcohol, sufficient quantity. Moisten the ingredients with some of the liquid and pack in a percolater. Put in enough diluted alcohol to leave a statum above it. Macerate for 48 hours, covered; percolate, pour on enough diluted alcohol until 32 fl ozs of extract or essence is obtained.

Essence of Tea.

The same gentleman writes:—Will you kindly state also how essence of tea is prepared?

Extract the crushed tea leaves with water and then distil the liquid in a vaccum. The first portion of the distillate, which contains the essential oil and other volatile flavour,

is extracted with ether, and the oils are afterwards mixed with the extract which remains in the still Both the delicate and heavier flavours are preserved in the extract or essence in this way

White Lead

A. H Hyderabrd, writes —Please let me know how *sufida* or white lead is prepared.

It is made by suspending rolls of thin sheet lead with malt vinegar, or acetic acid, in closed vessels The evaporation from the acid being kept up by the vessels being placed in a heap of dung, or a steam bath Lead carbonate of commerce, however prepared, is not the pure carbonate of lead, but always contain a certain proportion of hydrate. It is generally largely adulterated with native sulphate of baryta or heavy spar, and sometimes with chalk. The former may be detected by its solubility in dilute sulphuric acid, or a solution of oxalic acid or oxalate of ammonia after having been treated with sulphuretted hydrogen, or a hydrosulphurate, to throw down the lead Pure carbonate of lead does not lose weight at a temperature of 212°F , 68 grains are entirely dissolved in 150 minims of acetic acid diluted with 1 oz of distilled water and the solution is not entirely pptd by a solution of 60 grs of phosphate of soda The solution in nitric acid should not yield a ppt when treated with a solution of sulphate of soda Used as a superior white pigment, and, in medicine, as an external astringent, refrigerant, and desiccant The particles of carbonate of lead prepared by pptn, or by any of the quick processes are in a somewhat crystalline and semitranslucent condition, and do not cover so well as that just noticed, also called fine white and flake white The following are some of the varieties of white lead found in commerce: —

Dutch white lead —From flake white, 1 cwt , chalk, 3 cwts

Ordinary —Flake white, 1 cwt, chalk, 7 cwts These form the best white lead in the shops

English white lead Flake white lowered with chalk

French white lead —From litharge dissolved in vinegar and the lead thrown down by a current of carbonic acid gas from coke.

Hamburg white – From flake white, 1 cwt, chalk, 2 cwts Also sold for best Dutch white lead

Venetian white —From flake white or pure white lead and chalk in equal parts.

Imitation Gold

Dr G. B Nayate, Kannod, writes —Can you kindly give a process for preparing imitation gold and oblige ?

Dutch Gold, Manuheim gold, mosaic gold, or molu pinchbeck prince's metal, red brass similor, tombac These names are applied to several varieties of fine coloured brass, differing slightly in tint, and in the proportions of copper zinc At the celebrated works of Hegermuhl near Potsdam, the proportions, copper 11 parts to zinc 2 parts, are employed to produce a metal which is afterwards rolled into sheets ... the purpose of making Dutch le... This alloy has a very rich, deep ... Its malleability is so remarka... be beaten out into leave... 1/52900 inch in thickness...

The imitation go... shades of yellow ... are extensivel...

coatings. The principal places where this special industry is carried on are Vienna, Nuremberg, and Furth, and it is usually pursued in connection with the manufacture of bronze powder. The composition of these alloys varies from 77 to 85 parts of copper and 23 to 15 parts of zinc.

The metals are melted in graphite crucibles, and kept fluid for some time, in order that the alloy may become perfectly uniform. It is then cast into semi circular ignots about 23½ inches long and 3/4 of an inch in diameter. These ingnots are rolled cold into strips about the thickness of ordinary writing paper. Each strip is folded together so as to form a package about 23½ inches long. This is beaten under a hammer set in motion by a motor, into a ribbon about 3 3/4 inches wide. The very thin strips obtained in this way are cut up into pieces, which are again hammered until they begin to tear at the edges, about one thousand of them being placed together for this operation. They are then cut into square leaves, which are placed between parchment leaves and beaten under a rapidly moving hammer until they are about 5 3/4 inches square Each of the leaves is now cut into 4 squares of equal size, which are again beaten between parchment leaves, in the me manner as genuine gold leaf, except the process is not usually carried so far, ich as this would entail too much l expense for a cheap material. etal is placed in books of tissue 's previously been rubbed revent the leaf metal from l colour of leaf metal ne time by a coat- s or pale yellow. ure colour—aniline colours being especially good—the colour of the leaf may be changed to red, green, violet, etc., etc

Uses of Orange Peels

Mr. Liladhar Premji, Bombay, writes :—Orange peels, which we throw away daily can be utilised to scent tea. Take peels of two good oranges and press it on 1 lb of tea. This will separate the fragrant oil which the peel contains and will scent the tea. Then mix well the tea and put into a jar and place it in sumshine for some days. Then take out the tea and put it into boxes. Two orange peels are sufficient for one lb of tea. If stranger scent is wanted take peels of three or four oranges.

Rose Tea.

Mr. Liladhar Premji, Bombay, writes:—Natural rose scent is given to tea as follows :—Take a jar and at the bottom spread dry new rose buds which are sold at grocer's. Then spread tea over it and again spread rose buds. So this until sufficient tea is put in the jar then finally spread rose buds and tightly bottle it and keep in sun-shine for some fifteen days or more. Afterwards remove the rose buds and pack the tea in boxes. This will perfectly scent the tea with a mild sweet aroma. If stronger scent is required, repeat the process.

Scientific & Industrial Topics

Joint Stock Companies.

In August last only ten Joint Stock Companies were registered in British India with an aggregate nominal capital of 16½ lakhs. They comprise one banking and loan company in Delhi (nominal capital, 1 lakh); one

insurance in Calcutta (Rs. 20,000); three trading companies in Bengal (4½ lakhs): one rice mills company Madras (Rs. 12,000); two tea planting companies in Bengal and Madras (7½ lakhs); one estate managing company in U. P. (1 lakh) and one national investment company in U. P. (2½ lakhs)

A New Industry.

A new industry is about to be introduced in Ceylon. The Department of Agriculture has under consideration a scheme for the production of acetic acid together with allied products. Estimates have been obtained from England and the Continent as to the cost of obtaining charcoal and efforts are being made to get the small plant to begin with made locally. It is said that not only is the production of acetic acid in Ceylon a sound proposition, but that alcohol for motor fuel is also another of the commercial possibilities of the venture.

A Weaving Factory.

The small state of Banganapalle has newly started a weaving school consisting of several fly shuttle looms and ordinary pit looms, under the expert management of a teacher from the Government Serampore weaving Institute. Carpets of various sorts, towels, silk cloths, coating cloths, Persian carpets, etc., are manufactured. It is giving work for several people. We wish the Factory a long and prosperous career and hope this will be taken as a model for our big Zemindars and Rajahs for adoption in their States for ameliortion of their subject.

A New Use of Charcoal.

Japanese physicians declare that it is impossible for internal poison to result in death if the victim swallows a quantity of charcoal as soon as the first gastro-intestinal disturbance is felt. Charcoal not only absorbs the gases, but has a special action upon many alkaloids and ptomaines.

Sugar in India.

As a result of the European war the sugar market in India has been much disturbed in consequence of the stoppage of import from Germany and Austria. The Java sugar that is likely to reach India, together with the little of the country made sugar, is all that is now supplying our huge want of the commodity. Such is the stress on the market that even *Gur* has considerably risen in Price and the good thing cannot be had in the retailers' shop at anything less than 5 or 6 as. per seer. There was a time when India could produce not only the whole of her requirement of sugar but could export a considerable surplus. This was before the foreigners were in the arena of competition. The war, inspite of its ugly influence on the economic life of the country, has presented us an opportunity to revive our sugar industry once again and our countrymen should not allow it to slip out of hand. The Government is keen in improving the sugar industry and if some of our traders who are thrown out of business owing to the war, b
themselves together and ask the help
Government seriously to do the
ness, we have every hope of its
distant date. As appears fr
the war is not coming to
even if fortunately co
few months Germ
ly to be able to
neries and
any early
we mu

Agricultural Pursuit.

In this connection it would be well to note that our countrymen, as a result of the war and the consequent closing of many avenues of employment, are gradually taking to agriculture as a means of livelihood. Agriculture, it is superflous to say, is the principal source of livelihood for about 80 per cent of our countrymen. But as it is always neglected by our middle class men of education and means and is thrown on the poor and ignorant cultivators for its improvement no perceptible improvement has been done. We have plenty of arrable land lying fallow in our country which can be exploited for agriculture by such class of our people who can make agriculture a subject for study and improvement and a source of decent income. And if the European war can turn several of our young men to agriculture, it will be a blessing in disguise.

In fact, we are glad to note that several young men have come to us to enquire where good arrable land can be had at cheap rate for an agriculture settlement. We enquired of the Agricultural Department where such land can be had on Ry side in Bengal or Behar and whether the Government can help such youngmen in any way. We have recei- [illegible] the following as a sound piece of advice [illegible] middle class men who may turn their at- [illegible] agriculture: "My advice to all these [illegible] who desire to go in for agri- [illegible] all, before putting down any [illegible] -taking to get a practical [illegible] years—otherwise they [illegible] before they are [illegible] agriculture like [illegible] training to [illegible] different parts of the Province (Bengal) where this training can be obtained; similar farms are maintained by the Government of Behar and Orissa in their province. At present in Bengal we take about 20 apprentices every year and pay them each Rs. 15 per month besides providing them with free quarters but the class of lads, we get, is very poor indeed. They only wish to get Government appointment on Rs. 20 per month at the end of the year. The young men you mention in your letter would be much better material to deal with, but that class generally only stays a few weeks on the farms when either the work is too much for them or they find they have no real inclination for agriculture. In any case they leave the farms.' It is rather in sorrow than any thing else that the writer penned the above lines. They demand serious attentions of our countrymen.

Sample Exhibition of German and Austrian Goods.

As we are going to the Press we received the following from the Director General of Commercial Intelligence for publication.

"An exhibition of samples of imported German and Austrian goods will be held at Calcutta about the first December next under the direction of the Commercial Intelligence Department. The following classes of Articles will be exhibited:—glass beads and glassware of various kinds; matches; soap; hardware including enamelled iron ware, locks, hings and safes, metal lamps, cutlery, etc.; earthenwar; pencils; brushes; toys; textiles, especially German shawls, blankets, flannels, mixed silk and cotton velvets, Austrian shawls and braid. It is desired to exhibit at the same time samples of Indian manufactures of similar classes of goods, and Indian manufactures are invited to send samples of such goods to the Director General of Commercial Intelligence, 1, Council House Street, Calcutta, as early as possible. The Director-General of Commercial Intelligence will arrange for the exhibition of these samples and their return, if desired, at the close of the exhibition. The exact date and time and place of the exhibition will be notified in due course. Such an exhibition of samples will, it is hoped, be held later at Bombay and Madras, if suitable arrangement can be made."

Brief Queries & Replies.

L. H. A, Sukkur.—Why not write to the Laxmi Trading Co, of Botad or the Kathiawar Genl Agency, Rajkote, both of Kathiwar, for photo enlargement agency ?

S N & Co, Agra —Wants addresses of rice merchants of Rangoon, of cut piece merchants of England, Germany and India, and of celluloid dealers of India

T. B, Cawnpur —Wants a book on the manufacture of Photographic dry plates, films, papers, etc

M V. T, Baod —Wants addresses of booksellers which stock books in all the Indian languages

A G Karthicapally —Wants a medical book and a dictionary in the Malayan language

Agricultural asstt Timvalur —For the prospectus of the book write to Messers Thacker, Spink & Co, of Calcutta

Engineer, Shikarpur —For the chemicals write to Mr S Sen M A Co Industry' and for the enamels to Gillanders, Arbuthnot & Co, Calcutta

R D G, Baroda —Wants the address of any firm which deals in machines for making lamp wicks

P S Patiala —Sorry we do not know which of the ayurvedic schools is authorized to grant degrees

B R, Murree —Wants to know the name of journal which deals exclusively with sugar.

Roll no 1402, Trichinopoly —Wants to know the method of making scented hooka tobacco

S V Atmakur Wants to know the subscriptions and addresses of the Bulletin of the Hindusthan Association, U.S A and of Hindusthan Student

R P. S, Patna —Wants addresses of firms that can Supply mercerised cotton, Japanese handkerchiefs and hosiery. Consult page 18 of vol IV for books on ink manufacture

P D G Battalpur – For the book write to R. Cambray & Sons, Calcutta

A. G, Calcutta —Consult June 1914 issue of Industry for books on ice making

H N, Bhawanipur —Kindly consult pp 54 & 228 of Vol. IV for preservation of milk and Condensed milk.

Manager, the Desh Seva Yagna Talod —In reply to the query of P. S R, Salem, he says that (1) about learning mail order business he may write to Chemist & Co, Pherwani House, Shikarpur, Sind and that (2) about Messers Cunliffe Russell & Co, he is informed that the prices charged by the said firm are very dear for the Premium Bonds. He can supply him with these bonds on some terms at a much cheaper rate, provided he will pay one p c Charity to this "Yagna' or any prize he may gain. He can also undertake to repurchase from him the bonds at the same price at any time.

J. D Rai Kalimpong —Yes, what you say is true But there are already many weaving establishments and a few nib making factories. Time energy, and capital can extend the number of such factories

R C & Bros Amritsar —Rock candy is sugar candy Omit the ivory black andlamp black from the formula and add some white pigment such as zinc oxide, white lead, etc and let us know the result

The Sindh Lozenges mfg Co, Sukkur — Have you read the article on chalk crayons on p 125 of vol II & the recipes on coloured crayons in vol IV ?

Roll no 2217, Chunar —We do not know whether there is any separate auyurvedic treatise on venereal diseases But much infromation lies scattered in the works of Charak & Susruta and in Bhavaprokash (2) The testing of urine by ordinary method is not so satisfactory Chemical analysis is the best means A Contributor can teach you urine analysis fully for Rs 10 by correspondence (3) It is not possible to give all the names of the modern painters of India (4) what kind of reproduction do you mean photographic, lithographic, or what ?

M L K Rangoon – Add some tinchore jaborandi or cantharides to the colorless cocoanut oil, why not soak a little saffron in the oil ?

S R S Patiala —Kindly consult page 46 of vol IV for books on soap manufacture.

The Shiromani Works, Lahore —Write to B[?]o Industry for learning the manufacture of disinfectants and lubricating oils by correspondence.

Roll no 1727, Cawnpore —The firm has changed their quarters The present address is 27/1 Beadon Row, Calcutta

P S R Salem — What do you mean "ineding tissues ? Do you mean Catgut ? its manufacture is so difficult and com only an experienced pratical ph[...]r and physiological chemist can do

(Illegible), Fazilka —Name glass making have appeared

Roll no 489, Dehra D on Gardening and Dair ready appeared in Vo

S R M, Cocar the copying pen made in India a large sale

Calcutta Market

Calcutta, Nov. 3

EXCHANGE.

Bank T. T. 1-3 27-32
Bank O. D. 1-3 29-32
3 Months D A 1-4 3-8
6 „ „ 1-4 5-16

BULLION MARKET. Nov 3

	Rs.
GOLD—	
English Bar—100 (touch) per tola ...	26-2-0
National Bank ...	26-5-0
Australian Bar—(100 touch) ...	25 9-0
Sovereign—Victoria Shield, per piece	15 7-0
SILVER—	
English Silver Bar of 17 ½ dwt better per 100 tollahs ...	71-

PRODUCE MARKET — Oct 8

RICE.

Dwadkhani Rice—Rs 6-4 per md.
Banktulsi Rs 5-8 to 5-12
Boiled Patna Rs 5 8 to 5-1
Ballam Rs 5-2 to 5 8
Kazla Rs 4 to 4 1

DAL

Moog Dal at Rs 7-8 (For Black kind) Yellow at Rs 8 8 to 9 8
Masur Dal at Rs 7 to 0 per md
Arhar Dal at Rs 5-10 to Rs per md

SUGAR DESI

Cane.—Benares Rs 14 0 to 14 8 nominal.
Goor. Rs 6-7 nominal
Date—Dasara no stock
Goor no stock.

SUGAR IMPORTED.

Cossipur first white at nominal.
Small grain at Rs 12-0 per md
Crystal at Rs 13-8
Java 1. M. at Rs 9-6 per md

Interest and Discount.

agric of England from 29th Jan. 1914 3 %
the who Bombay from 4th June 1914 4 „
Bengal from 4th June 1914 4 „
all, Madras from 8th June 1914 7 „
taking ... md
years 12 per mo
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Industry.

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GOLD LEAVES—Per packet of 120 leaves Rs. 2 to Rs. 2... according to the size of the leaves.

SILVER LEAVES—Per packet of 1... leaves As. 8 to Rs. 1-8.

AMBER—A product of African and Japanese Oceans, Rs. 56 per tola

Packing & Postage extra.

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Industry

CONTENTS.

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December
1914

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When replying Avertisement kindly mention "INDUSTRY."

Industry

People's Ed.

A Monthly Journal of Handiacrafts & Commerce

VOL. V. CALCUTTA, DECEMBER, 1914. NO. 57.

How to Build up a Successful Business.

At this time of stress when all avenues of employment are being closed all round it would be of interest to note how trades are built by Westerners. We present to our readers Sir Thomas Lipton's account of himself and how his world-wide trade was built up.

"At the beginning of my career, writes Sir Thomas, 'when my first shop in Glasgow was opened and I acted as my own salesman, and then my own errand boy after the shop closed, I laid down a few hard and fast rules. These were the recipes for my success. They were: Be honest, keep pushing, use judgment treat your customers well.

To present day young businessmen I would give the following advice :—

First, beware of strong drink. Remember corkscrews have sunk more people than cork jackets will ever save.

The next is civility. Treat rich and poor alike. The poor man's twenty shilling is as good as the rich man's sovereign. The workman's wife with her basket on her arm is entitled to as much respect as the lady who comes in her carriage And as an illustration of the benefit of humility, I will tell you the following story of Benjamin Franklin, who, when ambassador for the United States at the French Court, speaking to a young man, said, "the last time I saw your father he received me in his study. As I was leaving he showed me a short way out of the house through a narrow passage crossed by a beam over head. He suddenly cried 'stoop ! stoop !" I did not understand what he meant until I felt my head thump against the beam He was a man who never failed to give good advice "You are going " he said, "and have to go through the world. Stoop as you go through it, and you will miss many hard thumps."

Thirdly I would recommend punctuality, which is said to be the soul of business. It is said of Charles Lamb, who at one time held a Government appointment, and who was proverbial for coming in late : that one morning, being later than usual, and his superior finding fault, Lamb offered this excuse, "If I do come late in the morning I try to make up for it by leaving early in the

afternoon" This was a good joke, but hardly the style of business to gain promotion. If you stick to business, business will stick to you.

These three essentials for success may be summarized as temperance, civility, and puntuality. A man who is not equally civil and polite to every client and customer, whether he be rich or poor, has little chance of becoming a successful man. Then he who is not punctual is generally the man who does not care or trouble to stick close to his business.

To foster your business concern like a child; to know it cannot thrive by itself ; to keep an ever watchful eye on its thousand details ; to be its shoestrings, so to speak , and, above all, to do these things oneself, and not leave them to the less interested—to do the work that others would do only a little less well—all this is the way to make the baby of a business thrive and come to a flourishing maturity.

I am often asked why we as a nation are beaten in trade. Speaking from knowledge in America, I would say in that case it is owing to their more up to date methods They are our most serious and powerful competitors. Young men are sent to all parts of the world to supply people with things they want. Their consular service is far superior to ours. The consuls representing the United States are chosen because of their business knowledge ; ours are selected chiefly because of their social standing or political influence , and in most cases British consuls pay more attention to the social aspects of their posts than to the commercial concerns. In certain posts I have come across absolute ninnies representing us while their American conferes, all "hustlers," carried off the trade formerly added to the wealth of Britain.

I consider the American boy is ahead of the British boy. I find that in America the managers of large concerns are often very youthful. In Britain their youth would be disqualification ; it would not command respect. That I believe to be a great error of policy in the affairs of a nation, a business firm or a family. I hold, therefore, that it would be a good thing to send every British boy to America when he is seventeen, and to keep him there for a couple of years. My experience in the states, to which I first went when I was fifteen, were the best commercial training I ever had. I find that apprenticeship still stands by me and it helped me more than anything else to the position I now occupy.

The value I place on industry in building up a concern and how I believe in devoted hard work at the thing once for all accepted as a man's "calling" in life, may be seen from the fact that even now I generally work from nine in the morning to ten at night. It was said by men who have a right to speak, that labour is anything but painful, however willingly undertaken and courageously done. But I think this was the conclusion of men who had one of the two kinds of labour to do—the entirely physical and the entirely mental. Hand work has its own liberty its own enlargement, its own relaxation, and also its own romance. So the man who makes a great business must put himself into it Work is the only talisman."

Cycle Overhauling & Repairing.—II.

(*Continued from page 167.*)

PLATING.

This article will treat with taking down the machine, for re enamelling and plating.

and it will be found that this a job which any amateur can tackle, and for which very few tools will be required beyond the ordinary tools which every cylist generally possesses.

RUSTING UNDER ENAMEL.

Doubtless the cyclist has often observed the way cycle frames rust under the enamel and gradually blister and throw the enamel off, and has been at a loss to understand the reason of it. This is caused by the frame being not properly cleaned bright of all rust before the first coat has been applied ; or even if the frame has been properly cleaned, it has been left to lie about and get rusty , or again, has been handled with damp hands after cleaning. Either of the above causes will bring about this undesirable result. Therefore it cannot be impressed too much on the amateur the necessity of carefully guarding against these causes of bad work.

EXAMINING FOR REPAIRS.

Before proceeding to take the machine to pieces, look over it well and see that any necessary repairs are executed before sending the parts away, and not after. A wheel may want truing, a crank or pedal pin straightening, etc., so do any of these before taking down.

REMOVING THE FITTINGS.

Completely strip the machine of all fittings, and put the parts to be replated into a box by themselves. Take out all bearing parts, bottom bracket axle and discs, front fork from the head, removing the ball races from head unless they are very securely fixed in their places, as they may get knocked out at the enameller's and lost. Take out the hub spindles and pedal spindles, wrapping the balls from each part up separately and marking them to where they belong.

Some difficulty may be encountered in removing pedal spindles from the cranks, as generally one is put in with a right hand thread and one with a left hand thread ; but not always in the same way by all makers, some putting the left hand threaded pin on the left side and some on the right. Some early pattern machines have right hand threads to both sides, so it will be well to be sure which threads are used before forcing them, as they may be only forced up tighter. Should they prove very difficult to remove, no harm will be done if they are left in the cranks ; but the platers prefer them removed.

REMOVING HANDLE GRIPS.

Tyres must, of course, be removed from the rims and grips from the handle bars. The latter is a job that requires care, as the grips may very easily be spoilt in getting them off the bars. They are generally fixed on with solid tyre cement hot, and must therefore be made hot to remove them. One way to do this is to hold the bar in the gas flame, as near to the grip as possible without burning the grip. They are mostly celluloid now or celluloid tipped, and therefore very inflammable. Do not hurry the job, but let the heat work up to the end gradually, then twist the grip off with the hand. Another way is to put it into hot water until the cement is softened ; but as this also softens the celluloid, care is required in taking off, or the grip is spoiled. If the grips are of the cork variety and somewhat the worse for wear, it will be advisable to fetch them off without ceremony and fit new ones ; they are cheap enough.

Preparing Parts for Plating.

It is not necessary, as is sometimes commonly imagined, to polish up the parts with emery cloth before sending to the plater's. It is only necessary to wipe the greasy parts, and take every part to pieces that is possible. Remove all nuts, pins, screws, etc., and send them detached. Do not put nuts back on the spindles, etc., but leave them loose.

Taking Wheels to Pieces

If it is decided to have the hubs replated, this will necessitate taking the wheels to pieces and, of course, rebuilding them. If this is considered too difficult a job and the plating is not very badly worn, it may be advisable to let this part go with a good clean up with some good metal polish. Taking a wheel to pieces and rebuilding is, however, not very difficult, and by the aid of instructions that will be given later, it may be tackled by any one with average ability.

Making List of Parts.

When all the parts to be sent to the plater's are ready a list should be made of every part to accompany them, and a duplicate kept for checking off when they are returned, as the platers may lose small parts in the vats, and then declare they were not received so be precise with this list. Mention each part separately, except the very small screws and nuts which may be listed as so many small screws and so many small nuts, etc. When the goods are returned, check them off carefully with the list before starting to use any of them, and at once apply for any that may be missing.

If the front fork crown is to be plated, the forks should be cleared of the old enamel before sending. Brake blocks should be removed, and if badly worn new ones procured.

Parts for Enamelling.

The parts for enamelling can now be taken in hand. These will comprise the frame, forks, mudguards (if any), and the wheels. If the hubs have gone to the plater's, the wheels must wait until they are rebuilt, when they can be sent with the frame, etc. The rims in any case will have to be cleaned of all the old enamel.

Removing Old Enamel.

There are several ways in which the old enamel may be cleaned off the various parts; but the thing will be to choose the best and easiest way to meet the circumstances. Where a lot of such work is done, the old enamel is stripped off by placing the work in tanks of hot potash, but this will, of course, be outside of the amateur undertaking one set of work only. Many scrape the enamel off with a blunt knife, finishing with emery cloth, but this is a slow process, and may be improved on if a brazing blowpipe or blowlamp is available. Heat about one foot at a time until the enamel is soft, and then scrape off, or if a wire brazing brush is at hand, brush it off with this. The blowpipe and wire brush is the method adopted by the writer and found quite satisfactory, especially when getting round the lugs and awkward places, where cold scraping would be very tedious. The writer has heard it said that this method is injurious to the tubing, but it is not so, as the heat used tends to release any stresses which may be present in the steel caused by the vibration and constant use and hammering on the road.

Of course, it is hardly necessary to say that excessive heat is not required, it does not require a heat that will make the lightest tube at all red, but just sufficient to well soften the enamel.

POLISHING.

When all parts have been thoroughly freed from enamel and cooled down, finish off with emery cloth, using No. 2 or No. 2½ first, and finally polishing off with F F or O, well scouring the tubes lengthwise and finishing off round the lugs with narrow strips of cloth used crosswise.

Now, as stated before, the finish and appearance of the enamel will depend mainly on the smoothness of the finished surface of the work to be coated, the very best of enamelling will look poor if applied to a rough surface. Therefore, the higher degree of finish that is put on the work before enamelling, the better will be the ultimate result. After the final polishing, dust and rub over with a clean piece of linen rag dipped in turpentine, and after that do not handle the tubes with the bare hand, but wrap some paper round a convenient part for handling. If a very highly finished, glass like appearance is required, as seen on new high class machines, the work must be hand polished after the final coat, but this will, of course, be charged for extra. It is not every enameller who can undertake hand polishing as it is generally done by women who do nothing else, but most large firms will do it if specified.

FINISHING WITH TRANSFERS

To preserve the original appearance of the machine and make it look finished, one or two transfers of the makers will be required. These can generally be obtained from the makers of the machine free if written to and a stamped envelope sent for return, the number of the machine given, and saying that the machine has been re enamelled. The enameller will fix them on properly if told just where they are required, or if it preferred to fix them at home a little good gold size is required. Place the transfer face upwards on a flat surface, and give the pattern only a thin, even coat with a small camel hair brush. Let this stand until almost dry, so that it only just feels "tacky" when touched with the finger tip. Place in position, carefully press down, and rub firmly all over with a piece of rag, being very careful not to move the transfer in its place, or it will be spoilt. Now damp the surface of the transfer with a sponge and warm water for preference, and after two or three minutes lift one corner and peel off. When quite dry give the surface of the transfer a coat of the gold size or transparent varnish. It should be stoved to set the varnish properly, but in the absence of a stove warm the back of the work over a gas jet, being careful not to make it too hot and so blister the gold. Do not be in too great a hurry to put the transfer on after gold-sizing it but let it get a good dry "tack" before applying. Ninety per cent of failures in transfer fixing are caused by not giving the gold size time to set properly. Should it appear rather too dry, slightly warm the surface of the work before putting on the transfer.

PRECAUTION IN ENAMELLING.

Precautions must be taken that the threaded parts, such as the inside of the bracket, lubricator holes etc, do not get filled up with enamel, as this will be found very troublesome when re assembling especially if taps are not available with which to clean out the threads.

Wooden plugs or corks should be screwed into these parts to keep the enamel from getting in. Another item which may be

overlooked is that when the pin and nut which holds the top of the back stays to the seat lug are removed, there is no support for the back forks, and it may get badly strained and out of truth, so it is as well to fit a dummy pin and nut in this to prevent this.

REASSEMBLING THE PARTS.

When the parts have been received back from the enamellers and platers and checked off, proceed to re-assemble as follows : Put the spindles back into the wheels, oiling with some good oil at the same time Re fit the tyres, if they are airtight and cover sound. Now take the back frame, fit the pin and nut to the back stays and the seat lug first.

Next fit the lubricators to the bracket, then the chainside bracket disc Fit the bracket axle, balls and other disc. Then fit on the cranks and the chain wheel, seeing that the cranks are in line and the cotter pins properly fitted Adjust the beating until there is no shake and lock up with the disc cotters Next assemble the pedals, and screw up tightly into the cranks. If the pedal pins have not been removed from the cranks assemble the pedals before fitting the cranks and chain wheel on to the axle.

Now fit the back wheel in position, put on the chain, and adjust up. If the machine has fixed mudguards, fit the guard before putting in the wheel. Fit the front wheel in the fork, and assemble the head parts. Then fit the brake part to the handlebars fix the grips, and put the handlebars in place.

The other parts can now be fitted up as desired, and with a general run round all nuts and screws and final adjustment of seat pillar and handle bars, the machine is ready for the road again, and should look as good as new.

(To be continued.)

Tin Boxes.

The reader must have seen around him in office or home various description of tin Boxes with designs in several colours. Such containers are used in thousands of firms in India for marketing their products.

Proprietory remedies, drugs, coffee, tea, cocoa, tobacco, spices, toilet powder, cosmetics, salves, ribbons, shoe polish, paints, oils, salts, pellets and even liquids are now held in tin containers, and they are even used for rivets and screws. The number of consumers is constantly increasing, for tin boxes can now be made more cheaply than wood, and even paper, while they are preferred to glass bottles for many purposes. Besides the consideration of cost they admit of elaborate decorations on the boxes themselves, doing away with labels. They preserve goods better than paper or wood, are not likely to be damaged by rough usage, while when they become dirty or fly specked in stock they may quickly be made fresh and new with a little soap and water.

But the pity is that although we have some firms in India to manufacture machine made tin boxes of various sizes we have scarcely any firm here to manufacture coloured or decorated goods as we import from Germany or America.

The process of making tin containers, somewhat complicated, is probably not understood by many who use hundreds of thousand boxes yearly. There is a popular notion that the box is first made and then decorated.

The method followed in Germany or and America is substantially as follows :—

A colour sketch of the design is first prepared and when approved it is drawn on a small lithographic stone. For the

half-tone effects that appear on some boxes a photo engraving process is used to transfer the design to the stone. All tin boxes are lithographed. Designed for both box and cover are then transferred in duplicate to a large stone capable of printing a whole sheet of tin. This large stone holds from 12 to 100 box and cover designs, according to size. Cover and box are printed together to insure uniformity of colour.

A standard size of tin plates that are imported in India is 20 by 28 inches. Some boxes have the design printed directly on the tin, but the greater number are printed on a lacquered surface. This lacquer, which is a fine paint, is applied to one side of the tin by a special machine. The sheets are then piled in large racks and dried in a kiln at 160 degrees for two hours or more, according to the color of the lacquer. The other side of the sheet is sometimes coated with a light gold lacquer, while in very fine boxes the inside is also covered with a creamy lacquer. The lacquered surface cannot be scratched with the finger-nail after it is dry, and this is the wonderful part of a modern tin box. Each sheet is tested, and those that take the slightest scratch are thrown out.

Lithographing is the next process. It is done on special cylinder presses. The design on the stone does not touch the tin direct, as when paper is being printed, but is transferred to a rubber "platen" on the cylinder and then to the tin, the soft rubber surface insuring an even application of the design to the unyielding metal. The design on the stones is not made in reverse, like type, but as it will finally appear on the box, being reversed when it touches the rubber and again when applied to the tin. The number of printings varies from one to five or more, according to the complexity of decoration. After each printing the tin is piled on racks and dried in the kilns a half hour. Some decorations have gold letters, which are obtained by printing with size and running the tin through a bronzing machine. This bronzing may also be done by hand. On stock boxes furnished to druggists in small quantities the name and address is printed from type, but the soft surface of the rubber platen gives a real lithographic effect. After the lithographing is finished the sheet is varnished and kiln-dried.

Tin sheets are irregular in size, so lines for cutting out the separate boxes and covers are printed with the design. The sheets now go to machines which cut them into rows of six or more covers and boxes. The former go to the die-stamps, which are huge presses running at high speed. The cover dies are somewhat like those used for embossing, having "male" and "female" parts. The rows of cover designs are fed by hand, being cut out and shaped one at a time. The tin is drawn into shape by enormous pressure - in fact, this pressure is so great that the sheets are first coated with a lubricant to prevent heating and wearing of the costly dies. Sometimes names are embossed on covers. Notwithstanding the pressure the fine lacquer surface is not broken, and though the finished covers are thrown around in big baskets they are never scratched. Covers are of many shapes, from the simple round lid of a shoe polish box to the square cocoa box cover with a round top. A die-stamp makes from 15,000 to 20,000 covers a day.

The boxes themselves are cut out singly from the whole sheet, and the oblong pieces are fed into a machine which turns up the two ends. Another machine forms them into

round, square or oval shapes and joins the ends in a flat double seam. Buttoms cut from plain or lacquered tin are then put on by another machine, the joints being effected by seams. No solder is used. A seamed box will not hold liquid. Tin containers for liquids are soldered The raw upper edges of the box are then trimmed by still another machine, which also puts on the "bead" or rim that supports the cover. Covers are also run through and trimmed. Some covers are perforated and fitted with revolving tops for holding powders and spices.

Action of Radium on Diamonds.

In a recent discussion of this subject it is stated that some fine colourless crystals of diamond had been embedded in radium bromide (60 grains of which cost £20,000 !!) and kept undisturbed for more than 12 months The radium has caused them to assume a beautiful blue colour, and their value as 'fancy stones" has been materially increased The speaker showed his audience a couple of diamonds originally of the same purity of colour One had been coloured by radium, the other was in its natural state. The colour of the radium tinted stone was very pronounced This blue colour was persistent and penetrated below the surface It was unaffected by long continued heating in strong nitric acid and potassium chlorate and was not discharged by heating to redness. To find out if this prolonged contact with radium had communicated to the diamond any radio-active properties, six diamonds were put on a photographic plate and kept in the dark for a few hours. Three which had a prolonged sojourn with radium and three which had not been near radium were projected on the screen by the lantern, and it was noticed by mere contiguity of the former the latter shone with an induced radio-activity. He also threw on the screen a magnified image of one of the blue crystals and it was seen in how regular and geometrical a pattern the radio-active emanations radiated from the crystal This observation had only been made a short time and is still under investigation Like the blue tint, the radio-activity persisted after drastic treatment. A diamond that had been coloured by radium, and had acquired strong radio active properties, was slowly heated to dull redness in a dark room Just before visibility a faint phosphorescence spread over the stone on cooling and examining the diamond it was found that neither the colour nor the radio-activity had suffered appreciably The diamond is remarkable also in being extremely transparent to Roentgen rays, whereas highly refractive glass, used in imitation diamonds, is almost perfectly opaque to the rays By this means imitation diamonds can be readily distinguished from true gems

Making a Hectograph without Gelatine.

We have been requested, times without number, to state how to make a copying appliance in which no gelatine or glue is used

Well, the following composition for instantaneous copying purposes resembles putty in a soft state, and does not harden when exposed to air. If accidentally cut or broken it will not require remelting to get rid of the

defect, as it may easily be smoothed down with the finger or a small piece of wood. The ingtedients are one lb of whiting and 4 ozs. of pure glycerine. Reduce the whiting to fine powder ; mix 8 ozs with all the glycerine and beat it up thoroughly. About 12 hours later, add the remaining powdered whiting. It will probably work rather stiffish, and seem too dry, but if placed aside for a short time the glycerine will spread through the whole of the whiting and render it perfectly moist. Turn the doughlike msss into a shallowtin, smooth it nicely down with a round hard ruler until a faultless level surface is obtained and the appliance is then ready for using. Any ordinary graph copying ink will do. Write on smooth paper, and transfer to the composition in the usual manner, rubbing the black of the paper gently. Sixty excellent copies may be produced, and a considerably greater number of weaker specimens. Wipe the residue of ink from the copier with a wet cloth or sponge, spread a sheet of white paper over the composition, pass the hand firmly across several times, to take up the aqueous moisture, peel off the wet paper, and another letter, etc., may be immediately proceeded with. A good black ink to be used with a hektograph may be made as follows : Take 4 ozs of aniline black (water soluble), 8 ozs of methylate spirit, 8 ozs. of water, and 16 ozs of glycerine, and warm until the colour is properly dissolved. Coloured inks may be made with the ingredients above mentioned, simply by varying the colours. For a red ink, using cosine, and for green, methyl green.

Fruit Candying.

During this season every one sees candied fruits in shops. They are relished by all, yet no one is curious about their manufacture. It is a very easy, profitable bus iness for any one who have patience, pluck, and energy, with a little capital and a little common sense.

Leghorn occupies the first place in Italy, and perhaps throughout the Mediterranean, for the preparation of candied citron and orange peel. Citron is brought for this purpose from Corsica, from Sicily, from Calabria, and other Southern provinces of Italy, from Tunis and Tripoli, and even from Morocco ; while the oranges imported into Leghorn, whether for consumption or for candying, are nearly all brought from the islands of Sicily, Sardinia, and Corsica. In all the countries contributing the raw fruit for this industry, it is treated in the same manner for the oversea passage. The fruit is simply halved and placed in hogsheads or large casks, filled with a fairly strong solution of brine, the fruit being halved merely to ensure thorough preservation of the rind by an equal saturation of the interior as well as the exterior surface. In these casks it arrives at the doors of the manufactory. The first process to which it is then subjected is the separation of the fruit from the rind. This is done by women who, seated round a large vessel, take out the fruit, skilfully gouge out the inside with a few rapid motions of the forefinger and thumb, and, throwing this aside, place the rind unbroken in a vessel alongside them. The rind is next carried to large casks filled with fresh cold water, in which it is immersed for two or three days, to rid it of the salt it has absorbed. When taken out of these casks, the rinds are boiled, with the double object of making them tender and of completely driving out any trace of salt that may still be left in them. For this purpose they are

boiled in a large copper cauldron, for one to two hours, according to the quality of the fruit and the number of days it has been immersed in brine. When removed from this cauldron, the peel should be quite free from any flavour of salt and at the same time be sufficiently soft to absorb the sugar from the syrup in which it is now ready to be immersed. The next process to which the rind is subjected is that of a slow absorption of sugar, and this occupied no less than eight days. The absorption of sugar by fresh fruit in order to be thorough must be slow, and not only slow but also gradual; that is to say, the fruit should be at first treated with a weak solution of sugar, which may then be gradually strengthened, for the power of absorption is one that grows by feeding The fruit has now passed into the saturating room, where on everyside are long rows of immense earthenware vessels, about 4 ft. high and 2 ft. in extreme diameter, in outline roughly resembling the famed Etruscan jar, but with a girth altogether out of proportion to their height and with very short necks, and large open mouths. All the vessels are filled to the brim with citron and orange peel, in every stage of absorption—that is to say, steeped in sugar syrup of about eight different degrees of strength. This process almost always occupied eight days, the syrup in each jar being changed every day, and with vessels of such great size and weight, holding at least ½ ton of fruit and syrup, it is clearly easier to deal with the syrup than with the fruit. To take the fruit out of one solution and to place it into the next stronger, and so on throughout the series, would be a very tedious process, and one, moreover, injurious to the fruit. In each of these jars, therefore, there is fixed a wooden well, into which a simple hand suction pump being introduced, the syrup is pumped from each jar daily into the adjoining one. A slight fermentation next takes place in most of the jars, but this, so far from being harmful, is regarded as necessary, but is not allowed to go too far. There is yet another stage, and that, perhaps, is the most important, through which the peel has to pass before it can be pronounced sufficiently saturated with sugar. It is now boiled in a still stronger syrup, of a density 40° by the testing tube, and this done in large copper vessels over a slow coke fire, care being taken not to prevent the peel adhering to the side of the vessel, by gently stirring with a long paddle-ladle. This second boiling occupies about one hour. Taken off the fire, the vessels are carried to large wooden trough, over which is a coarse open wire netting. The contents are poured over this, and the peel is distributed over the surface of the netting, so that the syrup - now thickened to the consistency of treacle—may drain off the surface of the peel into the trough below. The peel has now taken up as much sugar as is necessary. Next comes the final process, the true candying, or covering the surface of the peel with the layer of sugar crystals, which is seen on all candied fruits. To effect this a quantity of crystallized sugar—at Leghorn the same quality of sugar is used as is employed in the preparation of the syrup—is dissolved in a little water, and in this the now dried peel, taken off the wire netting is immersed. The same copper vessels are used, and the mixture is again boiled over a slow fire. A short boiling will suffice for this last process, for the little water will quickly be driven off, and the sugar upon cooling will form

its natural crystals over the surface of the fruit. Poured off from these vessels, it is again dried upon the surface of the wire netting, as before described. The candying is now complete, and the candied peel is ready for the packing room, to which it is carried in shallow baskets. In the packing room may be seen hundreds of boxes, of oval shape and of different sizes, for each country prefers its boxes to be of a particular weight.

Boxes for Keeping Food Hot.

Boxes to keep food hot overnight can be lined with hair felt or with silicate cotton, 2 in. thick. Silicate cotton (or slag wool) is best for this, but requires to be faced with felt or flannel, as it is a loose material, not woven. The food tin should fit in close against the packing, and not be loose or separated from it. Any kind of box will do, either of wood or of tin or of any other metal. Slagwool can be purchased from any firm which deals in metals, etc. This kind of boxes would be very serviceable, during this cold season, to keep food hot for some hours, and so, any enterprising man can make a good round sum out of a few materials. Here is a chance for men of meagre capital.

Guinea Grass.

The Department of Agriculture, Bombay, has issued the following :—

Guinea grass is a fodder resembling Lemon grass in appearance. Under favourable conditions it supplies a good, succulent nutritious green fodder throughout the year. The peculiar advantage of this grass is that it grows well under shade and especially so under mango trees. A small daily supply of succulent fodder can be obtained without any extra trouble and expense if it is planted along permanent water channels.

Guinea grass is a perennial fodder plant which responds both to manure and water. Both are essential for making a profitable plantation although it has strong drought resisting properties. In case of failure of water, the stumps will remain alive even for a period of six months or more when they will begin to throw out new shoots when rain again occurs. Where the above named facilities exist, a field should not remain without a small pot of Guinea grass.

The following instructions will serve as a guide in laying out a plantation :—

Soil.—Any soil is suitable, provided it is well drained. Guinea grass will thrive well on medium black soil which is plentiful in the Deccan.

Preparation.—This crop needs a friable condition of the soil which should be obtained by two ploughings, three or four harrowings and cold crushing if necessary. It is a heavy feeder and should therefore be heavily manured with farmyard manure at rate of 30 loads per acre.

Plantation.—Guinea grass is propagated by the seed or by division of tussocks (root stalks). Five or six root-bearing stems are planted in one place and the groups should be 1½ feet apart each way. The plantation should be laid straight both lengthwise and across, so that inter culturing will be made very much more easy. Planting should be done at the beginning of the rains on flat ground. When the plants take root, the ridges and water channels can be made.

After cultivation.—If the rainfall be sufficient the crop will not require extra irrigation during the mosoon. But later it will

have to be irrigated every 10 or 12 days throughout the year. The crop requires frequent hand weedings to keep it clean but the number can be lessoned if a common wooden plough is worked both lengthwise and crosswise after each cutting. A plantation thus started will keep paying for about three years, if manured every year with about 15 loads of farmyard manure before the rains

Cuttings—Guinea grass should be cut as close to the ground as possible The first cutting can be obtained in three months from the date of plantation and each successive cutting in about 1½ months' time. But during the rains the growth of Guinea grass is very luxuriant and one cutting can be obtained every month In all about 9 to 10 cuttings may thus be secured in a year—producing in aggregate about 20,000 to 25,000 lbs of green fodder per acre Thus an acre of plantation will supply five head of cattle with an adequate quantity of green fodder, viz, 10 to 15 lbs, per head per day, in addition to the daily allowance of 15 lbs of hay or kadbi (which in the absence of the green fodder is about 20 lbs per head per day)

The plantation needs renewal every third year. If this is not attended to, the tussocks grow into big stumps with several dead shoots in the m and consequently the quantity of cut fodder obtained is very much diminished.

Guinea grass has been successfully grown for several years on the Kirkee Farm on a large scale and has proved to be a very useful fodder for milch and working cattle. It also makes good hay Application for seed or roots for planting should be made to the Superintendent, Agricultural College Farm, Poona.

Small Trades & Recipes.

OINTMENT FOR BURNS.

Retino	50 grams
Wax	50 "
Oil of geranium	15 drops
Oil of Thyme	15 "
Oil of origanum	15 "
Oil of vervain	15 "

Melt the wax on a waterbath and mix the other ingredients by stirring

A CHEAP FERTILIZER.

Sulphate of ammonia	60 lbs
Nitrate of soda	40 "
Ground bone	250 "
Plaster	250 "
Salt	½ bushel
Wood ashes	3 bushels
Stable manure	20 "

Mix The above amount will suffice for six acres Can be used as a general manure for all purposes

TO PRESERVE MILK

(Morfit's Process)

In one gallon of milk at 130° to 150 F is dissolved one pound of gelatine, the mixture is left to cool to a jelly, when it is cut into slices and dried The compound is used to gelatinize more milk, and this is repeated till the gelatine is in the proportion of one pound to 10 gallons of milk

FOOD FOR HENS

Bone, ground, or slacked lime	12 ozs.
Powdered Gentian	1 oz.
" Capsicum	1 oz
" Ginger	2 ozs.
" Sulphur	1 oz.

Mix Give a teaspoonful of the above in a quart of food once daily.

ALLOY FOR BUTTON MAKING.

Brass (copper 267, zinc 93)	372 parts	
Zinc	62	"
Tin	31	"

A silver coloured metal will be formed when melted. It can then be cast into moulds.

LITHOGRAPHIC TRANSFER PAPER.

Dissolve in water ½ oz gum tragacauth. Strain and a d one ounce of glue and one ounce of gamboge. Then take French chalk 4 ozs. ; old Plaster of Paris, ½ oz. ; Starch, 1 oz.; powder and sift thorough a fine sieve ; grid up with the gum, glue and gamboge ; then add sufficient water to give it the consistency of oil and apply with a brush to thin sized paper.

SOLUTION FOR TYRE PUNCTURES.

India rubber	15 grs.
Chloroform	2 ozs.
Mastic	4 drs.

First mix the India rubber and chloroform together, and, when dissolved, the mastic is added in powder. It is then allowed to stand for a week or two before using.

WHITE STICK POMADE.

Melt together, white wax, 50 parts ; castor oil, 25 parts , venetian turpentine, 25 parts. For every 3 ozs of the mixture add 5 drops of the following perfume : -- Bergamot oil, 400 parts ; lemon oil, 300 parts ; lavender oil, 200 parts ; neroli oil, 50 parts ; cinnamon oil, 30 parts ; clove oil, 20 parts ; winter green oil, 10 parts ; otto of ylang-ylang, 5 parts ; coumarin, 1 part. Mix and let it stand for several days before using.

Reference Directory.

(U. S. A.)

Oil Mill Machinery.

(1) Buckeye Iron & Brass Works, Dayton, Ohio. (2) Cardwell Machine Co., Richmond, Va. (3) Farrel Foundry & Machine Co , Ansonia, Conn.

Paper Box Machinery.

Knowlton & Beach, Rochester, N. Y.

Photo Engravers' Machinery.

John Royle & Sons, Paterson, N. J.

Soap Making Machinery.

(1) Hersey Mfg. Co., South Boston, Mass. (2) Henry Martin Brick Machine Mfg. Co., Lancaster, Pa.

Crayons.

Binney & Smith Co., New York City.

Chemicals.

(1) Bull's Ferry Chemical Co., Shadyside, N. J. (2) Cochrane Chemical Co , Boston, Mass. (3) Larkin & Scheffer Chemical Co., St. Louis, Mo : (4) The Western Chem. Mfg. Co., Denver, Col (5) Billings Clapp Co., Boston, Mass. (6) Parke Davis & Co., Detroit, Mich. (7) Henry K. Wampole & Co., Phil , Pa.

Photographic Apparatus & Supplies.

(1) Bausch & Lomb Optical Co., Rochester, N. Y. (2) Eastman Kodak Co., Rochester, N. Y. (3) Rochester Optical Co., Rochester, N. Y. (4) Warren Mfg. Co., Warren, R. I.

Scientific Instrument.

(1) Taylor Bros. Co., Rochester, N. Y. (2) Henry Weinhagen, New York.

Inks.

(1) J. C. Blair Co., Huntingdon, Pa, (2) Charles M. Higgins & Co., Brooklyn, N. Y. (3) Sanford Mfg. Co., Chicago, Ill. (4) S. S Stafford, New York.

X-ray Outfits.

Edison Phonograph Works, Orange, N. J.

Art Stained Glass.

Penn-American Plate Glass Co., Pittsburgh, Pa.

Decorated Glassware.

(1) Jefferson Glass Co., Stenbenville, Ohio. (2) T A. Rodefer, Ballaire, Ohio. (3) Tarentnm Glass Co., Tarentum Pa.

Druggists' Glassware.

(1) C. Dorflinger & Sons, New York. (2) Evansville Glass Co., Evansville, Ind. (3) Whitall Tatum Co., New York.

Petroleum & its Products.

(1) Standard oil Co., New York. (2) Tide Water Oil Co., New York. (3) Union Petroleum Co., Phil., Pa.

Perfumers' Materials.

(1) Antoine Chiris, New York. (2) Dodge & Olcott, New York. (3) Larkin Soap Co., Buffalo, N. Y. (4) Lazell, Dalley & Co., New York.

Oil Cloth Making Machinery.

(1) John Waldon Co., New Brunswick, N. J. (2) The Moore & White Co., 15th & Allegheny Ave., Phil., Penn.

Reference Catalogue of Books.

Books on Fibres.

(1) Modern Flax, Hemp, & Jute Spinning and Twisting, By Carter. Rs. 7/8 (2(Ramie (Rhea) China Grass. By the same Rs. 4/6 (3) Fibres for Fabrics. By Garrett. Rs. 2/3 (4) Monograph on Fibrous Manufactures in the Punjab. By Gee. Re 1 (5) Kew Bulletin No. 1, Vegetable Fibres. Rs. 3/1 (6) The Theory & Practice of Jute Spinning. By Leggatt. Rs 9/3 (7) Theory & Practice of the art of Weaving Linen and Jute Manufactures by Power-Loom. By the same Rs. 3. (8) The Textile Fibres. By Matthews. Rs. 16 (9) The Fibrous Plants of India. By Dr Royle. Rs. 20 (10) Flax, Tow and Jute Spinning. By Sharp. Rs. 4/6. (11) Jute & Linen Weaving. By Woodhouse & Milne. Rs. 10. (12) Jute in Bengal. By Chowdhury Re 1/8.

Books on Brick.

(1) Brick & Tile Book. By Dobson, Searle & Hammond. 6s. (2) Brick cutting & Setting. By Hammond 1s. 6d. (3) Brick laying. By Hammcnd. 1s. 6d. (4) Brickwork. By Walker, 1s. 6d. (5) Bricks & Tiles. By Dobson. 3s. 6d.

Books on Mathematical Instruments.

(1) Mathematical Instruments. By Walmisley. 2s. (2) Mathematical Instruments By Heather. 4s. 6d.

Books on Lubricants.

(1) Lubricating Oils, Fats & Greases. By Hurst. Rs. 9/4 (2) Lubricants, Oils & Greases. By Redwood. Rs. 3/6 (3) Oils, Fats, Waxes and their manufactured Products. By Wright & Mitchell. Rs. 21/14.

Book on Mineral water.

The Practical mineral Water Maker. By Bratby and Hinchcliffe. Rs. 5/8.

Journals on Engineering & the allied Sciences

The prices, given, include postage and subscription for one year. (1) Architect. Rs. 22/8 (2) Architectural Review, Rs. 14 (3) Builder. Rs. 21/8 (4) Cassier's Magazine. Rs. 12 (5) Coal Merchant & Shipper. Rs. 12/6 (6) Colliery Guardian Rs. 23 (7) Colliery Manager. Rs. 6/10 (8) Electrical Engineer. Rs. 16/8 (9) Electrical Magazine Rs 9/8 (10) Engineer Rs. 30 (11) Engineering Magazine. Rs. 12/12 (12) Engineering News. Rs. 25. (13) Engineering Record. Rs. 20 (14) Engineering Review Rs. 11. (15) Engineering. Rs 35 (16) English Mechanic. Rs. 12 (17) Indian & Eastern Engineer, Rs 10. (18) Indian Engineering Rs. 24 (19) Machinist Rs. 14 (20) Marine Engineer Rs. 6/8 (21) Mechanical Engineer. Rs. 21/8 (22) Mechanical World Rs. 7/8 (23) Mining Engineering Rs. 7/8 (24) Mining Journal. Rs. 23/6 (25) Mining World Rs 21 (26) Model Engineer. Rs. 11 (27) Page's Weekly. Rs. 30 (28) Practical Engineer Rs. 11 (29) Railways Rs 10 (30) Railway Engineer. Rs. 12/4 (31) Science & Art of Mining Rs. 7 (32) Tramway & Railway World. Rs. 22 (33) Transport & Railroad Gazette. Rs 22 (34) Young Engineer. Rs. 4/8.

Books on Auditing.

(1) Audits, By Cutforth Rs. 5/11 (2) Auditing. By Dicksee. Rs 18/6 (3) Auditors. By Pirley Rs. 17/8 (4) Audit Programmes. By Spicer. Rs. 2/3 (5) Practical Auditing. By Spicer. Rs. 18/6.

Books on International Commerce.

(1) British India & its Trade. By Tozer. (2) Germany & its Trade. By Pogson. (3) Japan & its Trade. By Morris. (4) The United Kingdom & its Trade. By Harold Cox. (5) The United States & its Trade. By Nelson. Each Rs. 2/10.

Scientific & Industrial Topics.

A New Metal Cutting Process.

Metal cutting by means of oxygen gas has been introduced at the works of the Scotch & Irish Oxygen Co., Ltd, Polmadie, Glasgow, and has been inspected by a large number of firms engaged in the iron and steel trades. A jet of oxygen directed upon a previously heated spot of iron or steel ignites it, with the result that the metal acting as its own fuel burns away rapidly in the form of iron oxide. The instrument used in cutting the metal consists of an oxyhydrozen, oxy-coal gas, or oxy-acetylene blow-pipe, with an additional passage through which an independent and separately controlled stream of oxygen is supplied. This separate supply of oxygen may be discharged through the centre of the blowpipe, in which case the mixed gases employed for heating are conducted through an annulus surrounding it, or the supply may be brought in a passage immediately behind the heating flame. This expedient of maintaining an independent heating jet in operation while the cutter is travelling renders the cutting operation continuous. It furnishes the quantity of additional heat necessary to render the oxide fluid so that it can be blown away through the cut by the separate jet of oxygen. The cutting may be made to follow

any desired line, executing circles, curves, or profiles are desired. A piece of mild steel 18in. in breadth and 5in. in depth was cut through in 5 minutes, and a piece of 2in. plate 12 in broad was cut through in two minutes. The process is also applied to the welding of tubes and the cutting out of rivets.

Artificial Meerschaum.

If potatoes are peeled, macerated about 36 hours in water to which 8 per cent of sulphuric acid has been added, well washed with water, dried in blotting paper and then in hot sand for several days, on plates of chalk or Plaster of Paris, which are changed daily, being compressed at the same time, an excellent immitation of meerschaum, answering well for the corner, or any purpose not requiring a high temperature, will be obtained. Great hardness, whiteness and elasticity will be produced if water containing 3 per cent of soda instead of 8 per cent. of sulphuric acid is used and if after the potatoes have been macerated in the soda solution, they are to be boiled in a solution containing 19 per cent. soda, a substance resembling stag's horn, and which may be used for knifehandles, etc., will be formed. Turnips may be used instead of potatoes in the production of artificial horn ; and if carrots are substituted for the potatoes, a very excellent artificial coral will be obtained.

To Gild Silk.

Immerse a piece of white satin, silk or ivory in a solution of nitro-muriate of gold, in the proportion of one part to three ounces of distilled water. While the substance to be gilded is still wet; immerse it in a jar of hydrozen gas ; it will soon be covered by complete coat of gold. This process can be utilized in writing anything in gold on silk, etc.

"Proplatnium."

It is a new alloy and used as a substitute for the costly platinum in electrical tools and Machineries. It is prepared by melting, just in order, 4·2 lbs. of nickel, 5.3 ozs of gold, 16.5 ozs. of silver, and 0.5 ozs. of bismuth in a crucible. It is an American patented thing.

Milk Powder.

In reducing milk to powder, a patented Swiss process evaporates about 85% of the water at a temperature of 50° to 60°c. The milk is then exposed 4 seconds in a layer of $\frac{1}{8}$ or ¼ in. in depth on a surface heated to 105°c The second heating removes 9 or 10% of the remaining water and the resulting milk powder is not only sterile but the albumen is not coagulated. Why not try this process ?

Electro Plating byGalvanism

The new galvanic process of electroplating consists simply in rubbing the surface to be covered with a wet rag dipped in a special plating powder. This surface must be metallic or at least a conductor of electricity. The Br Patents show that a good nickel mixture contains 6 parts of nickel ammonium sulphate, 3 of metallic magnesium, 3 of chalk, and 7 of talc. powder ; for plating zinc, or iron, or copper, the materials may be 45 of zinc dust, 15 of ammonium sulphate, 3 of magnesium, 30 of chalk, and 7 of talc ·The damp cloth dissolves the ammonium salt, forming an electrolyte. The particles of magnesium become positive

...the heated surface a negative taking the deposit.

A Novel use of Coal Ashes.

We throw away tons and tons of Coal Ashes and never think of utilizing them. Coal ashes are utilized in a new material, to be called "cinerite," by being sifted, treated with soda solution and Copal varnish, then thoroughly kneaded and finally dried. Any colouring matter desired can be introduced. The product resists acid, moisture and heat, and it is desirable for wall and floor coverings, table slabs, etc. Being a good insulator, it is also suitable for electric conduits.

A Substitute for Indian Silk.

Six parts of isinglass are to be dissolved in twice their weight of water in a boiling state; and also in two parts of water, one part of spanish liquorice. Mix whilst hot and incorporate by a little at a time, with one part of finest ivory or lampblack, by the help of a spatula. Then heat it on a waterbath, till the water is nearly evaporated and it forms a paste.

Specific for Potatoe Blight.

The following is taken from the Kew Bulletin :—42 lbs of copper sulphate are enclosed in a bag of coarse canvas and suspended in a vessel of water, containing 220 gallons. In a separate vessel 26¼ of quick-lime are slacked by adding water and are passed through a sieve into the copper solution. It is now ready for use. This whole quantity will be sufficient for one acre of land.

A New Variety of Tracing Paper.

A solution of castor oil with 2 or 3 times its bulk of absolute alcohol, if spread on thin drawing paper with a sponge, will make it transparent and convert it into tracing paper. After the alcohol evaporates, the paper is fit for use. The drawing may then be traced in crayon or Indian ink. If then the paper is re-soaked in alcohol, the oil is dissolved and removed, and the sheet is restored to its opaque condition.

So p Paper.

Immerse a strip of unsized paper in a bath of cocoanut oil soap of good quality after which the strip is passed between rollers, cut into squares and it is then ready for use. A few such squares can be made into books and sold as a novelty. It may be used by travellers, explorers, missionaries, etc.

Drawing Room Ornament.

Procure a sponge ; place in warm water and squeeze out all moisture. Plant in the pores or holes of the sponge, seeds of millet, barley, gram, red clover, grasses, etc., in general, any seeds that will germinate easily and which will afford a variety of colour. Having the sponge so prepared, place in it a window or vase where the sun will reach it, sprinkling it with water every morning for a week.

To Detect Adulteration of Water in Milk.

Here is a simple test for home use. A small quantity of sulphate of di-phenyl amine is placed in a few drops of milk. If it turns blue there is water, otherwise not.

Uses of Wild Nutmeg.

It has not long been known that the seeds of the wild nutmeg trees are oleaginous but no special investigation has hitherto

been made of them. Chemical examination of the seeds of the *myristica canarica*, which are used by the villagers in South Canara for making candles, and the *myristica malabarica*, show that they yield in the former case a fat of considerable value to soap and candle makers, while the economic value of the latter is capable of considerable expansion If the seeds of the *myristica canarica* could be obtained in large quantities there would be a ready market for them, since the "oilnuts" imported into Europe, with which they compare very favourably, are in constant and increasing demand. Will any of our Canarese readers kindly take up the subject and investigate into the matter ?

Industry Buyers' & Sellers' Guide.

[Querists are requested to communicate direct with the parties, whose addresses, given here, are sufficient for the purpose.—Ed. I.]

M. H. P. Ghatalah, Supdt of Industries, Banganapalle.—Wants to buy the following :- silk, woollen, cotton and jute yarns of various counts ; gold, silver and other metallic threads ; Turkish cap manufacturing machines ; Doubling and silk twisting machines ; aluminium wares ; vegetable dyes ; magnetic sand ; white cedar wood ; lard oil ; Hattersley and Japanese hand loom and accessories ; univoltine and multivoltine and Eri silk eggs or cocoons ; European and Indian colonies of bees ; and parts and accessories of watches and clocks. Wants buyers of Elephants' buried bones ; cotton carpets ; Turkish and Hony comb towels ; silk suitings ; Bed sheets ; handkerchiefs ; durries ; cotton waste ; and manure of the following analytical value at eight annas per lb. : -

Nitrogen	4.91 %
Potash	0.98 %
Lime	7 41 %
Phosphoric acid	1.90 %
Magnesia	0.82 %

[Are not some components and their figures missing ? —Ed. I.]

The Eastern Hosiery Works, Lower Parel, Bombay.—Informs that they can supply wool, Japanese mercerised dyed yarn ; artificial dyed silk , socks at Rs. 3 15 to Rs. 15 per doz , and knitted neckties from Rs. 3-10 to Rs. 15 per doz. They undertake also to repair hosiery machines and to supply accessories, parts, new machines, and all kinds of yarns for the hosiery trade and industry.

Krishna & Co, Maneswaram, Bangalore.—Wants to buy a machine from which sporting nets can be manufactured , rubber stamp making machineries , and swan brand yellow Berlin wool. Wants buyers and agents of Mysore Giri Coffee , Goldmedal Ivory Combs ; sporting goods ; and all sorts of flowers and fruits (Your fourth query is quite unintelligible, so please repeat it in a clear manner.

D. V. Manjrekar, Commercial Agent, Chhindwara, C. P. - Wants to dispose of 3000 used Indian postage stamps at the following rates :—2 Rs. stamps at 12 As. per doz. ; 3 Rs. stamps at Rs. 4 per dozen. On receipt of postage stamps to the value of one and a half annas; he shall send instructions on earning money without capital, ability, or trouble.

A. G. H, & Sons, Coimbatore.—For the recommended books on patents, kindly write to D. B. Taraporevalla Sons & Co., of Bombay.

M. N. Godbole, Kanjkhetsi'schal, 'Girgaon, Bombay.—Wants 'buyers of peacock feathers.

K. M. Parikh, 33-35, Kolsa Moholla, Pydhonie, Bombay.—Wants to buy essence d'orient and an apparatus for filling wax into hollow imitation pearl beads.

R. S. Iyer, C/o R. R. Swamy & Bros, Madura —Wants to buy paraffine wax, stearine, and suitable wicks for making candles. Our advertisn Mr. Sen can possibly supply them.

G. N. Mytu, Bari, via Dholepur. Informs that he can supply as good batteries as those manufactured by the Ever Ready Co. and in any quantity.

J. R. Lalwani, Ram Krishna Mills, West Katcha, Hyderadad, Sind —Informs that he has the following automatic sellers for sale:—(1) Cigarette Selling machine, Rs. 25, (2) Picture Post card selling machine, Rs. 100, (3) Picture viewing machines, Rs. 150; (4) Sweetmeat vending machine, Rs. 200; and (5) Automatic aluminium name plate embossing machine, Rs. 400.

E. K. L. & Sons, Eklasapuram, Vaniyambadi, N. Arcot.—Wants buyers of checks, shirtings, towels, bedsheets, seamless beds, pillow cases, pillow covers, and bed covers.

S. C. Baroosh, Lakhimpur, P. O. Laimakuri, Assam.—Wants to dispose of a complete new set of 'How to master a mail order business" by Hugh Mckean with 20 new plans and a successful money making enterprise.

T. G. Strinivasa Iyengar, P. O. Narsingapetai, S. I. Ry.—Wants to buy nicolephones and a second hand nicole sound box.

Bah Tin, 37, Merchant Street, Prome, Burma.—Wants to buy Havanah Stems, Orrisroot, Tonkabean, Epsom salt, and whit castile soap. Wants buyers of famous Burma handmade cigars.

Ishwari Prasad, Koondi, P. O. Isapoore, Behar.—Wants to buy Harrisson Paten Sun Circular Ribber knitting machine.

Managing Director the Pharmaceutical Works, Lahore.—Wants to buy a small cotton carding machine to work by hand.

Dr. M. M. Mukherjee, Panitar Medical Stores, Itinda, Dt 24-Parganas.—Wants to buy machineries for making snuff and sotifool.

J. C. L Airy, B. A., Hd Master, Jagraon, Punjab.—He has invented a kind of canvas boots and shoes with wooden soles. He is ready to sell his patent right for Rs. 500 only

Sheopreshad Pathak, Cantonment, Saugor, C. P.—Wants to dispose of the following :—(1) Philosophical magazine and Journal of Science, Vol. Nos. 36 and 37; (2) Minutes of the Proceedings of the Institute of Civil Engineers. Part IV of 1909 1910; and (3) Professional papers of Indian Engineering Vol. 7.

Thakurdas Chopra, Ranjitganj, Gujranwala, Punjab.—Wants buyers of rice screens for husking paddy in rice mills. [Kindly write legibly.—Ed. I.]

G. Seetaramiah, Sudder Bazar, Bolarum, Deccan.—Wants to buy improved handlooms for weaving cloths and durries.

C. Bhan Dhingra, Multan City.—Wants buyers of Pain Balm for 12 as. per phial. You should give a regular advertisement.

S. A. Jubbar, Taungdwingyi, U. Burma.—Wants to buy the following automatic sellers :—"Egg laying hen" and "wolf and cat."

Thakurdass & Hotchand Bros., Old Sukkur, Sind.—Begs to inform that as they are

machinery importers, they can supply every kind of information regarding every class of machineries. They stock new, old, and second hand machineries of every description.

A. V. Narjundappa, P. O. Madapur, N. Coorg — Wants to dispose of a new Harrison Patent Sun Ribber Knitting machine at Rs 120; original price, Rs. 172-8.

R. S. Gupta, Teacher. A. S. Pathshala, Fatehpur.—Wants to buy second hand books.

V. Venkataram Iyer, Stn master, Markapur Road, M. S. M Ry.—For a distillation apparatus kindly write to the Bengal Chemical and Pharmaceutical Works, Ltd., 91, Upper Circular Road, Calcutta.

C P. Bajpai, Gorakhpur.—Wants to buy walking sticks, photo cameras pocket typewriters, and fancy toys of clay and rubber.

Manager, The American Trading Co., Cottonpet, Bangalore City.—Informs that they are the agents of the Harrison and Dubied Knitting machines. In reply to the query of P. S. R., Salem, he says that he can teach him the American principles of mail order business. In reply to the query of R. Khan, D. I. Khan, he says that he can make arrangements for teaching agency work.

Formulas, Processes and Answers.

Tambul Bihar.

Dr. M. M. M., Itinda, writes: will you kindly give a formula for [tambul bihar or chewing gum besides the one which appeared in last year's issue?

Take of spruce gum, 40 parts; gumchicle, 40 parts; powdered sugar, 120 parts. Melt the gums separately, mix while hot, and immediately add the sugar, a small proportion a time, kneading it thoroughly on a hot slab of marble. When completely incorporated, remove to a cold slab, previously dusted with powdered sugar, roll out at once into sheets, and cut into pellets. Any desired flavour or colour may be added to or incorporated with the sugar. Gum chicle is an American product and largely used in the so-called "sen sen" chewing gum.

To Join Glass.

Mr. L. S., Ajmeer, writes: Is there any method of joining broken glass?

Well, there are various cements, glues, mucilages, lutes, etc. for various purposes. Hewever, try the following one. According to *Dingler's Polytechnic Journal*, a very strong, transparent cement, applicable to wood, porcelain, glass, stone, etc., may be made by rubbing together in a mortar 4 parts of calcium nitrate, 50 parts of water. and 40 parts of powdered gum arabic. The surfaces to be united care to be painted with the cement, and bound together until completely dry.

To Gild Glass.

The same gentleman asks: What is the method of gilding glass which should give a clear reflection?

As we can't understand your query exactly, please repeat it. In the mean time try the following process. The proper flux for fixing the gold to the glass is anhydrous borax (i. e, borax from which the water of crystallization has been expelled by heat); the real gilding is effected by the aid of heat. For this purpose a solution of gold in aqua regia (chloride of gold) is precipitated by potash or green vitriol—i. e., ferrous

divided powder (brown) consisting of metallic gold. This is washed, dried and rubbed up with the anhydrous borax. Mix the same with oil of turpentine or gum water; apply with a brush. When heated in the muffle of a furnace, the oil or water escapes; the gum consumed, the borax melts and firmly attaches the gold to the surface of the vessel.

To Make Vinegar.

J S. P., Larkana writes Will you give some formulas for various kinds of vinegars? Is there any book on the subject?

We know of no such separate book kindly communicate with H. C/o Industry for formulas on various kinds of vinegars. He will give you several formulas with illustrations for a small fee. You have perhaps read our letter previously. However, here is a cheap process for making vinegar on a small scale. Mix 25 gallons of warm rain or any soft water with 4 gallons of molasses and one gallon of yeast. The mixture can be used after it has been allowed to ferment for 2 or 3 weeks.

To Fix labels on Tin boxes.

M. R., Cawnpore, writes: Will you kindly give a formula for fixing labels on Tin boxes?

Take of starch, 100 parts; strong glue, 50 parts; turpentine, 50 parts, water, a sufficient quantity. Boil the whole to the consistency of cream. This cement dries very quickly.

To make Drawing Paper, etc.

E., Jodhpur, writes: Will you kindly let me know how the drawing papers, used by engineers, draftsmen, overseers, etc., are made? How are they polished? How oil stains are removed from them?

The blue drawing paper of commerce, which is frequently employed for technical drawings, is usually little durable For the production of a very serviceable and strong drawing paper the following processes recommended. Mix a solution of: Gum Arabic, 2 c. cm., ammonia iron citrate, 3 c cm., tartaric acid, 2 c. cm.; distilled water, 20 c. cm. After still adding 4 c. cm. of solution of ammonia with a solution of potassium ferrocyanide 2-5 c. cm., distilled water, 10-0 c. cm., and allow the mixture to stand in the dark half an hour. Apply the preparation on the paper by means of a soft brush, in artificial light (ruby), and dry in the dark. Next expose the paper to ordinary light until it appears dark violet, place in water for 10 second, air a short time, wash with water, and finally dip in a solution of ean de javelle, 50 c. cm,, distilled water, 1,000 c. cm, until it turus dark blue Hang up in the air to'dry. Put a drop or two of acetic acid in the ink used for drawing, and when it is dry, varnish with mastic varnish. For removing oil stains, there is no satisfactory method. Use pipe clay mixed with water. Allow it to remain on the spot for several hours.

What is Enfleurage?

M. J. R., Bombay, writes: I wish to prepare the perfume of jesmine by the process of enfleurage. What is it?

Of all the processes for procuring the perfumes of flowers, this is the most important to the perfumer, and is the least understood in England; as this operation yields not only the most exquisite essence indirectly, but also nearly all those fine pomades known as "French pomatums," much admired for their strength of fragance, together

with 'French Oils," equally perfumed the odours of some flowers are so delicate and volatile that the heat required in the processes of distillation and maceration would greatly modify, if not entirely spoil them ; this process is, therefore, conducted cold, thus : Square frames called a *chassis*, about 3 in deep, with a glass bottom, say 2 ft. wide and 3 ft long. are procured: ove the glass a layer of fat is spread, about 1/4 in. thick, with a kind of plaster knife or spatula ; on this the flowers are sprinkled, completely over it and there left from 12 to 72 hours. For oils of the same flowers, coarse cotton cloths are imbued with the finest olive oil and laid upon a frame containing wire gauze in lieu of glass ; on these the flowers are laid and suffered to remain till fresh flowers are procured. This operation is repeated several times, after which the cloths are subjected to a great pressure to remove the now perfumed oil

Life of Sir Thomas Lipton.

T. & H. Bros., Sukkur, writes : Will you kindly let us know the source from which we can get a sketch of the life of Sir Thomas Lipton, Bart., K C. V. O., the "Tea King'?

Brief Queries & Replies.

S. A. J., Taungowingyi —Kindly consult an answer on papaw and papain on page 49 of Vol. IV of INDUSTRY. For crucibles write to the Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta

Dr. K C. V., Amritsar.—Kindly consult an answer on ink pills on page 45 of Vol. IV, of INDUSTRY. The printer's devil has made a mistake in the last but one line of that paragraph : 'cosine with a little sugar', should be read as "eosine with a little sugar."

[illegible] Bhan Dhingra, Kup Bazar, Multan City.—Informs that he can supply the synonyms of every chemical with the things themselves.

Rae & Co, Rajshahi.—Wants to know the full addresses of the following :—(1) Institute of certified public accountants, London ; (2) London Chamber of Commerce ; (3) Associated London Accountants' Association ; (4) Govt. Commercial Institute, Calcutta ; (5) Society of Incorporated Accountants and Auditors ; and (6) Incorporated Accountants, London. (7) Is there any capitalist to advance money, on 2 p. c. fixed interest and 40 p. c. of profits, for new commercial motor lorries to be purchased and put on lucrative motor service between Nattore, E B. S Ry, and Rajshahi, on more improved scale. (8) Can any firm undertake to supply and manage to repair motor lorri s of their motor service under profit sharing system.

M. L. S., Ajmeer.—(1) Your query regarding dry battery has been sent to an expert contributor, who will communicate with you (2) Wants to know the addresses of all the Ayurvedic Colleges in India. (3) We can't understand what do you mean by 'gilding glass which should give a clear reflection.'

P. B. N, Mylapore —Your query regarding the formula of the hair oil has been sent to an expert, who has been requested to communicate with you. (2) We do not know of any such glass factory that has been started on your side. You can also write to the Paisa-Fund Glass Works, Talegaon G. I. P. Ry., Dist Poona, mentioning INDUSTRY.

H D. Paikpara Road —We can give you expert advice on all your queries if you can mention the amount of capital you are ready to invest and agree to pay suitable fee Your queries on hair oils have been answered in Oct issue. All synthetic ottos may be used No, the mineral oil named, does not condense like cocoanut oil Yes, the colourless and odourless oil can be termed the base oil. Write to the Cawnpore Paper Box Co for your requirements.

F. D. R, Kalimpong.—The writer of the article which appeared in last year's Novr. issue has been requested to communicate with you.

J. L. G, Myitrge.—Are you quite sure of the analytical value of the manure you speak of ? Can you analyse the ash, whose percentage is 57.63 as you say ? If the percentage of sulphur is so great it can be used as a manure for cabbages, cauliflowers, onions, etc.

Y. I. Mulla, Club Road, Mandalay, W., Burma.—Can any analytical chemist take him as an apprentice in his laboratory ?

S. S. R., Udipi.—(1) Write to Thakur Chand and Hotchand Bros, Sukkur, Sind, for the machinery. Say Rs 200 to Rs 350 will be quite sufficient. (2) The new machine has not yet been put to market and so, perhaps, no one has yet imported it into India. (3) Kindly consult a physician.

T. G. Srinivasa Iyengar, P. O. Narasinganpetai, S. I. Ry.—He has got a nicolephone, the large wheel of which just above the main spring barrel has all its teeth worn out. Can any one supply the said wheel in India or in England ? (2) Wants the address of Wagner & Gewstley of London.

C. P. Bajpai, Gorakhpur.—Wants the addresses of America trained experts and students in agriculture (2) Various formulas on fertilizers have already appeared from time to time. Have you tried any one of them ? If so, which one and with what results ?

J. C. L. Airy, B. A., Head Master, Jagraon, Punjab.—(1) Can any one supply him with Japanese wooden shoes ? (2) The book to suit you is "The manufacture of Rubber goods" by Heil and Esch priced at Rs 9-3, and obtainable from Messrs Thacker Spink & Co., of Calcutta. (3) Research scholars and Professors are kindly requested to communicate with him on the subject of starting a Society or Institution of Invention in India. Its object would be to develop the inventive faculties of Indian youths so that they may be able to make sound progress in the various branches of agriculture, manufacture, and commerce.

K. N. N., Puttur.—Your queries have been sent to an expert contributor. He will communicate with you in due time.

J. K. Dutta, P. O. Kalimati, Dist. Singhbhum.—They have got some ruby ores which give a good percentage of small rubies to be put to many uses after being cut and cleaned. They have also got some coal, manganese, and lead mines. Can any person or firm negotiate for them if practicable ? [Why not work the mines yourselves ? That would be the best means of developing our industrial resources. Besides, that would give you a good profit. Kindly communicate with Mr. S. M. C., Diplomaed expert in mining from the Civil Engineering College, Shibpore, and who is now working as a Manager in one of the mines in the Jherria coal fields. Address his letter as mining Engineer, C/o INDUSTRY.—Ed. I.]

D. V. M., Chhindwara.—Kindly communicated with G. N. Mytu, Postal Tution School, Bari, Dholepur, for learning the manufacture of carbon rods and plates.

A. C. D., Lakhipur.—An expert has communicated with you we think. The book will be reviewed in our next issue.

M. C. R., Muzafferpur.—There is no separate book on the manufacture of buttons. An article will appear in due time. The names of woods, etc., suitable for button making, will appear in our next. The so-called ivory buttons are made of celluloid.

(Illegible), Abbottabad.—Kindly write legibly, what machine do you want to dispose of.

V. R., Bobbili.—For the books kindly write to D. B. Taraporevala Sons & Co., Bombay, mentioning INDUSTRY.

T. V. Govinda Rajalu Chetty, 10, Ganga Reddy Road, Egmore, Madras.—The seeds are not called *Bhawchee* as you say. The true Hindi terms are *Bhavanj*, *bakchi*, *babchi*, *babuchi*, *bovanbivin bavchiyan*, and *bavanchi* and the Bengalee equivalents are *Latakasturi*, *hakuch*, and *bavchi*. The kavirajes and hakims may buy the seeds so please communicate with any one of them. Dr Dymock states that in the Konkan the seeds are used for making a perfumed oil which is applied to the skin. The seeds are described by certain authors as hot and dry, by others as cold and dry, laxative, stimulant and aphrodisiac. The learned authors of the *Pharmacographia Indica* states: "They are recommended in leprosy, (leucoderma) and other skin diseases which depend upon a vitiated state of the blood, and are given internally and applied externally as a plaster whence the (Sans.) Synonym *kustanasini*; they are also said to be useful in febrile bilious affections and as an anthelmintic and diuretic. The Hindus class them with their rasayan or alchemic drugs." Several species of Psoralea have been used medicinally in America and have been found to act as gentle, stimulating and tonic nervines. A long account is given in the *Pharmacog. Ind.* of a recent analysis of the seeds. It is worthy of notice that one of the constituents separated was a *colourless* oil lighter than water, and possessing in a marked degree the odour of the seed which was obtained on distillation with water.

M. N. Godbole, Bombay.—The feathers of the peacock are much used in India for making fans and hand *punkahs*. They are collected into the desired form (usually flat oval), and sewn together with pieces of prepared quills and *shola* the colour generally being lac dye. A wooden or bamboo handle is then attached, by means of lac, at one of the corners. Large hand *punkhas* thus made are used for fanning people of rank and distinction on ceremonial occassions. The brilliantly coloured tail feather of the peacock is also used to decorate the turban of the Rajputs. A bunch of feathers is still the implement of conjurig and is carried by mendicants who pretend to skill in magic, especially by Jaina Vagrants. The feathers, being burnt to ashes, are also given with a little honey. in infantile coughs and cold in the chest.

S. M. & Co., Pondichery.—The book to suit you is Practical Treatise on soaps and candles by R. S. Christini, Rs 60, and obtainable from D. B. Taraporevalla Sons & Co., of Bombay. You can get the caustic soda from the Pioneer Alkali Works, Bombay.

Calcutta Market.

Calcutta, Dec 15.

EXCHANGE.

Bank T T	1-3 27-32
Bank D D	1-3 29-32
3 Months' D A	1-4 5-8
4 " "	1-4 15-32

BULLION MARKET. Dec 15.

GOLD—	Rs.
English Bar—100 (touch) per tola ...	24-8-0
National Bank ...	24-8-0
Australian Bar—(100 touch) ...	24-8-0
Sovereign—Victoria Shield, per piece	15-10-0

SILVER—

English Silver Bar of 17 ½ dwt better per 100 tollahs ... 70 14

Interest and Discount.

Bank of England from 8th Aug 1914	5 %
Bank of Bombay from 20th Aug 1914	6 "
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Bank of Madras from 12th Oct 1914	6 "

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Cane.—Benares Rs 14-0 to 14-8 nominal.
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Industry People's Ed.

Monthly Journal of Handicarfts & Commerce.

VOL V. CALCUTTA, JANUARY, 1914. NO. 58.

The Industrial Conference.

The tenth Session of the Indian Industrial conference has come and gone. The Hon Mr. Monmohandas Ramji of Bombay presided and perhaps no worthier man could have occupied the chair. The General Secretary of the Conference, Rao Bahadur R. N Mudholkar, presented his annual report of the Conference in course of which he stated that the last year had been the most gloomy year for industry, commerce and trade.

Of the resolutions that on co-operative movement received some extended attention. Mr. B. K. Iyer moved the resolution and appealed for further extension of the institution urging the Government to spend more money to help the movement as the Government could not afford to neglect it for the interest of the people and affirmed that the Government proposal to levy an audit free would only be crushing the progress of the movement in its infancy. A resolution on the starting and resuscitating of minor and cottage industries in India was then passed. Mr S. K. Mehta moved a resolution expressing the necessity of appointing a commercial attache to British Consulates outside British India to look after Indian commercial interests. In doing so he said the Trade Board Journal in Great Britain gave the public vast information of the commercial world. Such a thing was badly wanted in India. The Commercial Department of the Government of India, he agreed, was doing its best to raise the commercial activity of the Indians. The Indian attache would serve as a "via media" of information between India and the other countries. Mr. Yakub Hassain in seconding the resolution gave intances of the improvements people could make in articles exported by means of advice received and said if they had their own attaches at the various centres, they could secure the necessary advice in time.

The Presidential address of Mr. Ramji is a practical production of a practical man and should be read by our industrialists with interest and cencern. We regret our space is too small to contain the whole of it. We give below some extracts reserving our comment on them for a future issue.

"The present-day industrial problem presents to a student three aspects. The first is the rise and development of the Swadeshi movement, the second is the action and interaction of war and trade and industry, and the third is the various interesting questions regarding the special branches of commerce

and industry. I have tried to deal with each of these and evolve some solution to the different pressing queries which command our attention.

No country can ever wish to be in this position of industrial dependency on foreign countries and it was one of the chief objectives of the Swadeshi movement to do away with this dependence, to initiate once more industrialism and turn India again from being a purely agricultural couutry, dependent on foreign countries for her barest wants and requirements, into an industrial country not only supplying her own needs but exporting her surplus manufactured products.

This was the impetus of the Swadeshi movement. It resulted in several Joint Stock concerns being floated for diverse trading and industrial objects. The great thing was that such a modern western principle as Joint Stock principle of working was adopted and tried to be develoded in this country. From this point of view also it was one of the most significant movements in our times, a movement marking a combination of the East and the West in the world of commerce and industry. His Highness the Maharaja Gaekwar in his inaugural address at the Calcutta Industrial Conference gave a table showing the increase in the number of several factories from 1895 to 1904. We may well carry this comparison further by a decade and give figures of 1911 showing how this increase is maintained. I have also appended a table showing the great strides trading, industrial and Banking concerns have taken during ths last 20 years, as well as the remarkable increase in deposits with Banks. This last is an index to a great movement which has set in of recent years leading the people to invest their surplus capital and not to hold it away underground in vaults, a movement which, if rightly conducted and properly appreciated, means no small amount of benefit to the country at large. This increase in the number of factories and of Joint Stock concerns and of the Banking capital goes to show the potency of principle of Swadeshi and we have to take off our hats to those who have led on this movement through periods of storm and struggle.

Before I close this section on the Swadeshi movement, I should like to appeal to all my countrymen to give, as far as lies in their power, their support to the Swadeshi articles and thus to patronize home industries. Such a support will be a practical subsidy to the Swadeshi industries and will not smack at all of unnatural preferential tariffs. Even the free trade Great Britain has preference of this sort for the Swadeshi and I see no reason why we should not follow in its wake. I may go further and say that even if there is a slight sacrifice to be made in this purchase of Swadeshi articles we should gladly undergo it. This will make, as nothing else can, the newly started industries to tide over the difficulties of initial stages of working and to compete successfully with foreign industries. Japan and Germany have shown how through such a genuine and honest spirit of the Swadeshi, a country can rise up to one of the foremost positions in the world of commerce and industry and can attain to that enviable position when all the wants and requirements of its people are supplied by its own industries. The present war has shown how the cessation of our trade with enemy countries has left us in the want about several of our daily requirements. This is a position which no self-respecting people should tolerate. Let us then take a lesson

from all this happenings and strive to make this land a great manufacturing, as it is already a great agricultural country.

It is not still possible to gauge the exact nature of all the effects of war, we being still in the vortex of the struggle. Still we have some idea of these consequences as they are felt and experienced by us, and it would not be out of place here to mention some of these. What we in India have principally suffered from is the cessation of our exports to enemy countries which were some of our largest buyers of raw products. Ours being a mainly agricultural country, this cession f exports is felt markedly in its effects on trade in general. Agriculturists being our mainstay anything which affects them adversely affects similarly the whole of the country. The danger is that their purchasing power diminishes and consequently all the different markets also show signs of stagnation. It is because of this that both the Government and the people are so anxiously studying our import and export statistics and trying to find a solution of the serious situation which has arisen with regard to some of our export staples, notably cotton. This commodity was hit the most and it was with regard to it that a Conference was recently convened by the Government at Delhi. The panaceas suggested from different quarters to relieve the situation erred in taking note of only one commodity at the expense or to the neglect of others. It is true that due to the closing of German and Austrian markets cotton has heavily gone down and that our ryots will suffer much in consequence. The proposed schemes, however, about cotton storage and banking facilities to cotton trade specially are apt to be taken advantage of by only middlemen, the ryots being left in the same position. If these pitfalls are avoided and if a scheme is evolved for giving financial facilities not to one trade only but to trade in general it will be welcomed by the public. How different are the positions and demands of different trades may be seen from the fact that while the middlemen in cotton demanded that the new crop of cotton should as far as possible be delayed from coming on the market, Jute manufacturers wished the ryots to bring their stocks at once as the large orders they had received from Russia and the United States would otherwise not be fulfilled.

The industries which can well be developed in this country are many but the principal of them may be classified as follows :—Glass, glass bangles and chimneys, cheap hardware, porcelain ware, umbrellas, cutlery, varnishes, boiled oils, soaps, pharmaceutical products from various organic raw materials used in various industries as bases, paper, leather goods, phosphatic manures, twines and ropes, needles and nails and screws, candles, cigars and cigarettes, tanning substances, lac products, starches and sugar. Owing to our deficiency in indigenous industries our exports show large items of raw products which again are imported in manufactured form. Thus we exported last year about 32 lacs of Rupees worth of Tobacco and imported in manufactured Tobacco of 75 lacs and a quarter. Hides and Skins were exported of the value of 16 crores of Rupees while manufactured leather goods were imported of the value of 55 lacks of Rupees. The export of wool was Rs. 2 crores and 75 lacks while woolen goods were imported of the value of 4 crores of Rupees. The export of cotton amounted to 4 crores of Rupees while the import of cotton piece-goods was valued at 67 crores of Rupees.

I fear that this present war will lead again to the recrudescence in this country also of agitation for preferential tariffs.

No, sirs, it is famous to talk about preferential tariffs for our country as long as we have not got a fiscal autonomy in the real sense of the word. Let us by all means devote our energies to building up of new industries but let not any success be expected from our endeavours to carry out the production with scientific skill and with as minimum percentage of expenditure as possible. The scheme of holding exhibitions and pub-

lishing pamphlets is all right but surely the Government must proceed further and give its encouragement in a more direct and tangible form. What is really wanted is the appointment of special experts by the Government to study and report on particular industries.

The new industries we think of starting cannot afford at their initial stage to employ experts to give advice and information which are preliminary to the starting of all industries. Only the Tatas can spend lacs of rupees for the advice of scientific experts and thus build up their industries on a substantial rock-like basis.

With regard to the development of our trade, I am long since of opinion that India should have, if not a seperate Consular service of her own, at least distinct Indian sections at the different consulates controlled by trained Indian assistants to give all necessary information to Indian merchants about requirements of foreign countries.

The question of Railways and Irrigation is one of the most interesting in this country. As a matter of fact these too should never stand in terms of antithesis to each other. It is only because of the peculiar conditions of this country that a short of unnatural and fictitious opposition is set up between them and it is felt that their interests are not identical.

To an agricultural country like India irrigation is the only panacea for averting the ever haunting dread of famines and it is also capable of yielding a good income to the Government.

While I plead for irrigation, I must not be understood to mean that the work of developing the present railways and construction of new ones should cease. Railways also are an indispensable factor in the commercial life of the nation. I would especially urge the construction of feeder Railways which would tap the interior of the country and give an impetus to the Inter Provincial trade. For this latter purpose motor traction may also be suggested as being in some respects a more economical and convenient mode of carrying the goods. It has already been adopted in the United Kingdom and has sometimes proved in the inland districts to be a rival even to the Railway companies.

The Government is rightly devoting special attention to agriculture recently. In order, however, that all these efforts may bear fruit and that our agriculture can get benefit of some of the latest Western discoveries in Science, I think that both the Government and the public should consider a question which is party social and partly economic, I mean the question of small holdings. Due to the peculiar laws of inheritance of the Hindus original holdings are getting sub-divided, generation after generation till some times the present holders have to rest content with barest strips of land hardly sufficient for kitchen gardens. What incentive can there be on the part of the owners of these small holdings to introduce scientific agriculture on their land? Even if there is an inclination there is the want of capital and facilities. It is just because of this that there has developed in the West a movement both to intensive industrialism and intensive agriculture.

There is also another resolution which is a hardly annual and that is the demand for Technological Institutes at different centres.

With regard to the Conference itself it should extend its scope of work and not remain satisfied with holding this Annual Session. As far as I know there are already committees for different Presidency towns. What should be done is that these Committees may be entrusted with the work of a Presidency or a District Office, as the case may be, for answering all inquires on industrial matters, considering industrial problems and for generally discharging the duties of an Industrial Bureau throughout the year.

It would be a mere truism if I were to observe that there is a great future for the Industrial development of India. A new spirit is in evidence both on the part of the Government and the people for a mutual co-operation for developing Trade, Commerce and Industries which form the backbone of a civilized nation The present war has shown as nothing else did before, the willingness of India to bear the burdens of the Empire and to make any amount of sacrifice for the cause of the Empire to which she is linked by the strongest bonds of loyalty and gratitude. It has cemented the bonds between Great Britain and India and it will not be considered out of place to hope that after the war a new era will begin for the trade and industries of this country."

Oil Cloth.

As the import of this useful thing is practically at a standstill, it is high time that we should try to manufacture it here. It is a pity that though this useful commodity has a large variety of uses and applications in various articles, yet no one cares to know the process of its manufacture.

In America the manufacture of oil cloth is an industry which is carried on with the aid of very simple machinery—machinery so simple, in fact, that it is seldom out of order, and the costs of repairs are trifling. The buildings in which the operations are carried out are constructed on an entirely different plan from large machine-shops, the tendency being to minimise the ever present danger of fire by locating the different steps of the industry in as many buildings as possible and isolating them. The plant which we describe is one situated on the crest of a hill in a suburb of the old city of Brooklyn, known as fresh pond. The buildings and grounds are 26 acres in extent. The various drying houses are separated by a series of great buttressed fire walls, which sometimes form the end of one of the buildings but are generally separated from each building These walls are perforated by fireproof doors, which permit of rolls of oil cloth passing through them on the elevated platforms called "railways." Should a conflagration occur in a building, sprinklers and firepumps are automatically operated to extinguish the flames.

Oil cloth consists of burlap canvas, which is painted repeatedly with a body colour and then printed with a pattern consisting of 2 to 10 colours. The burlap, which comes from Scotland, is brought to the factory in bales containing 12 to 15 bolts of 152 yds each. Burlap used is made in six widths, 38, 47, 56, 74, 75, and 93 in. wide, though for special use it is made narrower, as for stair oilcloth. The bolts of burlap are sewed together by women in the basement of one of the buildings, in order that a large roll may be obtained to be sized and dried. The object of the sizing is to stiffen and give a surface which will take the paint, and in the cheaper and lighter varietis of oilcloth the back is not painted, therefore in this case the size is dyed. The size is made on the floor above, and is allowed to flow while hot into the vat. The burlap passes under a bar known as a "knife," around the pair of rollers, and is finally wound on a great bobbin. Five of the bolts of cloths form a single roll. Beyond the sizing machine is a blower and air heater, which furnishes an enormous volume of hot air to be used in drying the sized burlap. The wet rolls are taken to a room on the floor above, which immediately adjoins the drying room. Here they are pulled forward by pins which are attached to endless chains, and pass underneath a sash of a window and out on an iron frame work, which is boxed in, and which receives the heated air from below. The burlap makes three turns of this drying arrangement, which is 60 ft. long. As the temperature in the room is 220 °F., no men work in it ; but the course of the cloth may be watched through windows at either end. The calendering rolls and the endless chains are operated by a two cylinder engine. As the burlap emerges from under the window-sash it is automatically marked into lengths, and then passes over three calender rolls, which are heated by steam, which press and iron it. The burlap is then drawn from the calenders by tension rollers, and is cut off into lengths and rolled up.

These pieces of cloth are then taken to the buildings, each very large, being usually five stories in height, and wide enough to permit of a considerable number of racks on each floor. All the paint used is ground and prepared on the premises, the linseed-oil being kept in two large iron tanks in the yard, holding 250,000 gallons. The paint is brought to each floor in tubs, which are wheeled to the painting machines. These machines are of the utmost simplicity, and are very effective. They move across the width of the building on a track, in order that they may be brought in front of each row of racks, for after the burlap is painted, it must be allowed to dry in a rack by itself, out of contact with other pieces. The racks are built of yellow pine, and a considerable portion of the floors of the buildings are likewise slatted to allow of free circulation of air. At night, steam is turned on to assist the drying, and sometimes in cold weather steam is used in day time. The roll of sized and dry burlap is put on a reel, and it then passed over two pads and under two knives. The paint is thrown on to the burlap by dipperfuls, the knife distributing it evenly. The piece of cloth, after being painted, is pulled on to one of the racks, which are 76 ft. long, and there are 24 tiers of them on each floor, and the building have generally 7 ranges. In all, there are 5533 drying frames, aggregating 276,000 sq yds. of space. The end of the oil cloth is secured by a clamp. A rope is attached to this, and threaded through the proper slats in the drying frame by a workman, who walks through a narrow hallway between each pair of racks. The end of the rope is brought out, and 3 or 4 turns taken around the winch-head. The speed is adjusted by friction, so that the cloth is pulled steadily through the painting machine, and a wire at the top conducts it to the ground. The paint on the cloth dries in the space of a day or so, and the cloth is then rolled up and taken to a rubbing machine. It consists of a pair of parallel bars, which are actuated in opposite directions with the aid of gears and cranks. Each bar carries a number of pumice stone blocks, which serve to smooth the surface as the painted burlap is drawn through it sand is also thrown upon the cloth, to assist the action of the rubbing blocks. The painted burlap is rubbed after each coat, and the number of coats depends upon the grades. In the most expensive oilcloth four coats are given on the face and two on the ack, and, as it requires a day or so between each step, it will be seen that a considerable period must elapse before the oilcloth is ready for painting. In the cheapest oilcloth one coat is given to the face and none to the back. The edges are trimmed before printing.

Oilcloth may be printed both by hand and machine, hand work being used for the heaviest and best grades and samples; but the machine work is faultless. The printing blocks are of three varieties, pin or line blocks, depending on weather the pattern is produced by incised lines or by separate wood pins, and metal blocks. Pin-blocks are made by taking a piece of maple and sawing it both longitudinally and transversely with a series of fine saw cuts which form small square pins; the ones not needed in the pattern are clipped out. In the line blocks, parts of the continuous lines not needed are cut away. Blocks are required for each colour, and some patterns require as many as six or ten colours. The machines are ones

soft. long, and the oilcloth is fed in at the rear and is pulled forward 18in. each time the blocks descend. As was the case with the painting machine, this entire printing machine moves up and down the room, in order that the printed pieces of cloth may be delivered to the different sets of drying racks. The printing blocks are secured to cross pieces of frames, which move vertically with the aid of cams. The blocks are inked by rollers which run in boxes, and the boxes being filled with paint. Each roller inks one block, which prints one colour. In operation with the aid of a so-called crooked wheel, the painted burlap is moved forward, and at the same time all of the printed blocks descend, each printing its own colour. Thus at the first block only one part of the pattern in one colour will be printed, while at the last block the entire pattern of oil cloth is completed. As the blocks rise, the ink roller runs under the blocks and inks them, rolls back from underneath, and the block descends again. On each pattern is a block called a masher, which is simply an uncut block with all pegs or lines left in place. This spreads and smooths the paint in descending.

As the printing progresses, the piece is drawn into the drying room. Owing to the fire underwriter's ruling, the buildings are kept isolated so that in this case there is no direct communication between the printing room and the drying house This difficulty is got over by a series of iron doors, which permit of the piece of oil cloth being drawn though them. Each time the machine is moved it is drawn in front of one of these doors. A moveable shed, one story in height, passes up and down outside the building, and the oil cloth is drawn through this movable shed into the drying house. Once in latter the oilcloth can be raised to any floor through traps, and is drawn through racks as before. It requires from three to twenty days for the printed oilcloth to dry. The oilcloth is then rolled and dried again for a month or so.

Hand printing is used exclusively for samples, and very largely for the heaviest oilcloth The principles involved do not differ from those in which the macnine is used. The block, which is 18in square, has a handle, and is linked upon a pad, the paint being supplied and spread with the aid of a bristle brush. After all of the colours have been applied, and a masher used to spread the colours, the oil cloth is pulled forward 18 in by a rope, and the next section is printed. The oil cloth is pulled into the drying frames as before.

After the finished product has become perfectly dry and hard it is taken to a varnishing r om. The varnishing machine consists of a metal trough which holds the varnish. When it is turned down the varnish runs out of twenty spouts distributing it evenly over the oilcloth, which is rapidly drawn between a metal and a printer's roller, the latter spreading the varnish. Workmen, with the aid of brushes, serve to distribute the varnish The oil colth is hauled into the drying racks as before. After it is entirely dry, it is rolled up and stored with other rolls of its pattern in a warehouse. An open crate or shook is used in packing the oilcloth for shipment.

Every square yard of good oilcloth weighs 3¼ lbs. to 4½ lbs, each gaining by the application of the paint 3 lbs. or 4 lbs. weight, and hence the quality of this man-u

facture is judged of by the weight. Whiting mixed with oil is often used in spurious cloth prepared in this way speedily cracks and becomes useless. Good cloth, with a very stout canvas, is used for covering verandahs, and will last nine or ten years, while common cloth become useless in one year.

[Valuable information on this subject is given in "Spons' Encyclopædia of the Industrial arts," to which the reader is referred for illustrations of the machinery employed.—Ed. I.]

Coal-Tar Disinfectants.

Among the substances which have attained a considerable reputation as disinfectants and antiseptics are the derivatives of coal tar, commonly known under the name of carbolic acid, cresol, etc. Gas tar is a very complex substance as will be seen by a glance at the following table :—

CHIEF CONSTITUENTS OF GAS TAR.

Liquid Hydrocarbons:	Solid Hydrocarbons :
Benzole,	Naphthalene,
Creosote oil,	Anthracene,
Toluol,	Chrysene,
Xylot,	Pyrene,
Cumol.	Pitch.
Alkaline Products:	**Tar Acids:**
Ammonia,	Carbolic,
Analine Series,	Cresylic,
Quinoline Series,	Rosolic,
Pyridene.	Acetic,
	Prinolic.

The disinfectant powers of coal tar reside entirely in the last group shown in the table, viz., the tar acids. The other bodies, while possessing strong odours, have no germ-destroying powers. Some of these bodies coagulate albumen, thus hindering the action of the other substances which are germicidal. Again, certain bodies present in coal tar of the nature of pitch, resim, oils, etc., neutralize and completely check the action of the disinfecting tar acids.

Coal tar in its entirety, while possessing antiseptic and preservative properties, is not a disinfectant. Certain of the higher carbons, such as napthalene, anthracene, etc., possess powerful odours smelling strongly of tar. Napthalene is the basis of cakes or blocks sold as a disinfectant to hang in sinks, closets, etc. It has a powerful odour and mas's smells, but these compounds are in no sense disinfectants. In most of the derivatives of coal tar the mistake has been made of presuming that a penetrating odour was the equivalent of germ-destroying power.

The germicidal power of coal tar resides only in the tar acids or phenol group, and the efficiency of the members of this group depends upon the care with which they separated from the other constituents of coal tar, and the separation of the members of this group from each other.

Briefly stated, when coal tar is subjected to heat the different degrees of temperature employed will separate different properties. Thus by fractional distillation the germicidal acids may be separated from the other constituents of the tar and these acids may be separated from each other.

Of the coal tar acids only carbolic and cresylic acids possess germ-destroying power. The best known of the tar acids is phenol or carbolic acid. If in the distillation of carbolic acid the tar oils are carried over, its value is greatly depreciated.

Time has shown that the reputed disinfectant value of carbolic acid has been greatly overrated. It has a distinct field of

usefulness in surgery, but in disinfection work the use of carbolic acid has greatly declined.

Carbolic acid is not absorbed by organic matter, hence does not penetrate the structure of bacteria. Carbolic acid does not neutralize ammonia nor sulphureted hydrozen. It is not deodorant. The strong odour of Carbolic acid is in a sense objetionable, but more than all is deceptive as the smell is manifest when the strength is utterlyinsufficient.

To actually kill bacteria requires a considerable strength of carbolic acid. It has no action upon certain forms of disease-producing bacteria, and many of the spore forms are very resistant to carbolic acid in any strength.

The action of carbolic acid is enhanced by a combination with mineral acids and with Alkalies. The so-called crude carbolic acid (100% straw colour) is a more powerful germicide than the purified acid.

The tar acids designated in the table above given as roslic, acetic and brinolic are valueless as disinfectants. The tar acids grouped under the name "Cresol" or "cresylic" acid have of late come into use as disinfectants.

The cresols consisting of meta cresol, ortho-cresol, and para-cresol have a higher density and higher boiling point than carbolic acid. These cresol bodies are all highly antiseptic and germicidal. The three cresols above named have more energy when combined than when used singly and again have much m re power than carbolic acid

Saponified or as cresol salts the cresols quickly penetrate all forms of albuminous matter, and are highly distinctive to disease organisms.

The cresols are not as corrosive to the flesh as is carbolic acid, and they do not possess the same highly poisons properties.

The cresols to exhibit their best power should be separated from the other constituents of coal tar which greatly hinder their action. That is, the cresols exhibit their highest and best germicidal power when entirely free from the light and heavy tar oils, potch, carbon and other compounds, and when separated from carbolic acid or other tar acids.

In many of the coal tar disinfectant compounds sold in commerce, the active disinfectant acids, especially the cresols and phenols, have been removed. In other preparations the germicidal power is masked by the pitch and hydrocarbon compounds. In many cases only the creosote smell remains to deceive the user.

Of the coal tar disinfectants, "Camphenol" is an emulsion of the three cresols with camphor, the latter chemical enhancing the action of the cresol compound. "Cresol disinfectant" is the three cesols—meta, ortho, para—Saponified so as to be readily soluble in water and thus susceptible to every possible use. 'Sanitary fluid" is a special distillation of coal tar acids saponified This preparation readily mixes with water forming a milky emulsion and is intended for the coarser work of disinfection. "Creolin Pearson" is a dark coloured liquid antiseptic said to contain 20 per cent of cresylic acid with neutral hydrocarbon oil and Resinsoap "Cyllin" is a dark alkaline liquid prepared from cool tar, said to contain 60 per cent of a new analogua of Phenol, which is neither caustic nor toxic, forming a white emulsion with water, and is recommended as a deodorising antiseptic. "Izal" is a white emulsion of oxidised hydrocarbons, obtained from

"Kelvolin" is a dark-coloured oily fluid, with coal oil, containing 40 per cent of Izal oil, slight tar-like odour. It contains 40 per cent of the homologues of phenol, and contains no free alkali. "Lysol", a German speciality, is a dark coloured alkaline liquid, obtained by the saponification of cresols, and containing the higher homologues of phenol. It is said to be stronger antiseptic and less poisonous than phenol. White "Sanitas Fluid" is a totally different substance. It is the aqueous solution resulting from the action of water upon air-oxidized turpentine, containing as its active principles hydrogen peroxide, thymol, a soluble camphor, and some camphoric acid.

However, carbolic and crystals (Red Cross Brand) is a crystallized phenol free from all else save carbolic acid. Carbolic Acid Crude (marked 100 %) contains all of the Carbolic acide and a greater portion of the cresols. It is only sparingly soluble in water, and has a use in the commoner forms of disinfection.

The lesson to be learned from a study of coal tar disinfectants is that every compound of coal tar is not a disinfectant.

That the odour of coal tar is not a standard by which its germicidal power may be judged. The most odourous constituents of coal tar possess the least germicidal power.

That to exhibit disinfectant power the constituents of coal tar must be separated and prepared for the particular purpose to which they are to be applied.

Bicycle Overhaulig and Repairing.

(*Continued from page* 169.)

Re-enamelling a cycle at home without the aid of a stove to harden the enamel may easily be undertaken. Of course, it must not be expected that the ultimate result will be the same, or the work wear the length of time that would be the case when the machine is properly done and stoved ; but a very good result may be attained if care is taken all through, and the job is not hurried or scamped in any way. Good work requires time and attention, and in this particular branch the ultimate result depends very largely not only on the care and attention in carrying it out but in a very great measure on the preparation of the surface of the material to be treated.

ENAMELS.

The materials usad on a job of this kind are entirely different from those used in the stoving process, as in the latter a special stoving enamel or Japan is used, which will not set or dry without the heat of a japanning stove ; but by the process to be described, either one of the proprietory cycle enamels put up in 6d. and 1s bottles and to be obtained at most cycle depots, must be used, or best carriage black japan, or the ordinary flat colours used by carriage painters, and afterwards varnished.

The first named method, common cycle enamel, will probably prove the simplest, but will not give the best results. Avoid spirit black, that is, one made up with spirit. These blacks dry very quickly, too quickly ; in fact, some of them dry before they can be properly laid on, and consquently produce an uneven, patchy appearance that never will look well. Moreover, the surface will clip with the slightest provocation, and soon look shabby. These spirit blacks are only suitable for touching up, where some part has become chipped or rubbed ; such, as the edge of rims, mudguards, etc.

TOUCHING UP.

A word or two here will be in place on the item of touching up, as even this may as well be done properly.

The most frequent cause of the necessity for touching up is rust, which forms on the surface of the steel where the enamel has become thin or worn, and allowed the damp to attack the metal. Before the parts are touched up, the rusty pl ces should be throug' ly rubbed down with emery cloth until the metal appears bright, taking care not to scratch the surrounding portions of the enamel that are not to be coated, as the scratches will show through the new enamel put on, especially if coarse emery cloth is used.

Where a badly chipped place on a prominent part is to be touched up, the object to attain when rubbing down is not to leave any sharp edges of the old enamel surrounding the rubbed down portion, as this shows up quite plainly when dry. The edges should be rubbed down well, so that there is no abrupt termination to them ; then the patched place will not be visible.

Probably the best results will be obtained by using carriage painters' flat colours, and varnishing for the finish. This will look better and wear better than any other method if properly done.

To make a good job, the machine must be taken to pieces, and all the old enamel cleaned off, as explained in the second article in the previous issue, in preparing the parts for sending away to the enameller's. A very important item is the workshop or room in which the job is to be done. The preparation of the work can be done anywhere that is convenient ; but the painting or enamelling requires a suitable room. Dust, cold, or draughts are fatal to good work, so a room must be selected free from these drawbacks. Not only must the room be clean and free from dust, but the workman's clothes should be free from dust.

TOOLS.

The tools must be clean also. These precautions more especially apply to the final varnishing, and for this warmth is particularly desirable. The domestic kitchen with a fire and the door shut is a desirable place. A suitable brush or brushes are necessary. A Common penny paint or gum brush is not suitable ; but get an one inch or 1¼ in. flat camel hair or similar brush. If this is carefully cleaned after using for the first coating, it can be used for varnish ; but get it perfectly clean, first in turpentine, and then wash well in warm soap and water, and dry before using again.

It may be inconvenient to get a small quantity of suitable materials from the colour and varni h shops, and as so little will be required, probably the best way will be to go to a carriage builder's and get the colours and varnish from them ready mixed for use.

APPLYING THE ENAMEL.

With the machine taken down and properly prepared by scraping or otherwise, and well rubbed smooth with emery cloth, rub over the surface with a turpentine rag, to remove any trace of grease, and when quite ready to give the first coat, dust carefully over with a linen rag free from fl ff or loose pieces, going carefully into all corners or holes, where any dust is likely to lodge. Give the work a good, even coat, not put on too thickly so as to run, and hang up to dry. Let this be for 24 hours to dry and harden before giving a second coat.

Before applying the second coat, look over the work well for any brush hairs or rough places, which should be first removed. Let the second coat dry as before, and again examine for blemishes. If a little goldsize or varnish is mixed with the flat colour it will allow the surface to be rubbed down very lightly with a little powdered pumice on a damp cloth. This will give a nice, smooth surface on which to give the finishing coat of varnish. This should be put on evenly and with a good flow, but not too thickly, or it will run and look unsightly when dry.

The remarks referring to care in freedom from dust and dirt of any kind, either in the room or the work or tools, specially apply to varnishing process. Also the remarks regarding the warm room being free from draughts. Do not start to handle the work to assemble the machine until it is quite dry and hard. The longer it is left to harden before handling the better; it should be left for two or three days if possible.

Transfers should be fixed and any lining done before varnishing, but do not attempt any lining unless skilled in that particular branch, as it is much more difficult than it looks, and unless done properly, entirely spoils the look of the job

In doing the wheels do not forget the inside of the rims, and see that all rust is rubbed off with emery cloth before painting. It is not necessary to give the spokes two coats and a final varnishing, as it is likely to make them have a thick appearance, besides being a somewhat tedious job to go over these three times with the brush. Rub the old enamel off with a piece of emery cloth, dust and give one coat only of a little colour and varnish mixed. The best way to do the spokes is to begin at the crossing, inside, go all round about 3 in. or 4 in. up, then from the nipples down to where the first left off. Reverse the wheel and repeat; then finally do the outside of the spokes, then the inside of the rim, finishing off on the outside of the rims. The rims may with advantage be given to coats.

Should the hubs be in a rusty condition and too bad to clean up, and it is not desired to take the wheels down for replating, they may be improved and stayed from further rusting by giving a good clean up to free from all rust, and then giving a coat of aluminium paint.

In assembling the machine be careful in handling, as the appearance of the varnish may easily be spoiled until it is really hard, which would take some days.

(To be continued.)

Small Trades & Recipes.

DOG SOAP.

Petroleum	5 grams
Wax	4 "
Alcohol	5 c. c.
Good Laundry Soap	15 grams

Heat the petroleum, wax alcohol in a water bath until they are well mixed, and dissolve in the mixture the soap cut in fine shavings. Pour into wooden moulds. This may also be used on man or cattle for driving away vermin.

DRY CHEMICAL FIRE EXTINGUISHER.

Sodium chloride	6 lbs
Ammonium chloride	6 lbs.
Sodium Bicarbonate	8 lbs.

Powder each separately, weigh out and mix. A few handfuls of this may be thrown into the fire, or the mixture may be dissolved

in water and the solution thrown into the fire by a hand pump.

CHEMICAL BLOTTING PAD.

A cheap and excellent substitude for blotting paper may be extemporized as follows :—Mix 14 parts, by weight, of gypsum and 2 parts of potato flour with sufficient water to produce a plastic paste. Pour or press into a suitable mould. As soon as the mass has become hard and dry it affords an admirable blotter.

BLUE BLACK INK.

Bruised blue Aleppo gall nuts	6 ozs.
Crystallised Ferrous sulphate	2 ozs.
Powdered Gum arabic	2 ozs.
Vinegar	2 ozs.
Water, enough to make	24 ozs.

Also add enough of indigo-carmine to give a blue tint. Macerate, with frequent shaking for a fortnight, and then decant or filter and bottle. A very permanent blue-black ink.

PAIN KILLER.

Spirit of camphor	8 ozs.
Tincture capsicum	4 "
" Guaiacum	2 "
" Myrrh	2 "
50% Alcohol	16 "

Mix. It can be used externally and internally. The above composition very closely resembles the famous American remedy, "Perry Davis's Pain killer."

LIQUID GLUE.

Best white glue 4 parts ; lead carbonate, 1 part ; soft water, 8 perts ; alcohol, 1 part. Dissolve the glue in the water on a water bath, stirring constantly ; then mix in the lead carbonate, add the alcohol, and continue the heat for a few minutes ; lastly, pour into bottles while it is still hot.

Glass and Glassware.

(*Note by the Com. Intelligence Department.*)

The total value of articles of glassware imported into India in the year ending 31st March 1914 was £1,296,853. The following figures show that imports under this head increased steadily in recent years :—

Country from which imported.	Average of three years ending 31st March 1912.	1912-13.	1913-14.
	£	£	£
1. Austria-Hungary	418,814	460 482	582,541
2. Germany	142 272	172,116	190,577
3. United Kingdom	137,234	155,686	174,699
5. Belgium	105,560	127,245	129,023
5. Japan	69,612	150,850	105,422
6. China	3[illegible],849	32,015	33,248
7. Italy	27,585	2,6705	32 629
8. France	2[illegible],447	24,019	28,988
Other countries	1[illegible],[illegible]88	19,813	19,726
Total	977,161	1,168,931	1,296,853

Among the exporting countries Austria-Hungary easily takes the first place on account of her immense trade in glass bangles. She also takes a prominent place in the export of beads and false pearls and lamp glass. Under exports from Germany appear bottles and phials, lamp glass, and beads and false pearls. Some of these exports however are probably goods of Austrian manufacture, which are frequently shipped from Humburg owing to more steamers being available at Hamburg than at Trieste. The United Kingdom practically monopolises the export of soda water bottles and also exports other bottles and phials, sheet and plate glass and miscellaneous glassware. Belgium is the largest exporter of sheet and plate glass and table ware. Japan heads the list of exporters of beads and false pearls and

takes an increasing share in the export of bottles and phials (other than soda water bottles), table ware and miscellaneous glassware. The exports from China are practically confined to bangles, while France and Italy specialise in beads and false pearls.

From enquiries made in Calcutta the following details have been ascertained regarding a number of articles of which there is a large import. The prices given are wholesale prices, C. I. F. at Calcutta.

(*a*) *Chimneys.*—The largest business is done in the following descriptions :—

Description.	Austria. Per doz. s. d.	Germany. Per doz. s. d.	Belgium Per doz. s. d.	Japan. Per doz. s. d.
Line No. 10	0 10	0 9	......	0 7
" " 14	1 0	0 11	......	0 9
" " 20	1 10	1 9	......	......
" " 30	2 9	2 8	......	......
" " 40	4 6	4 5	......	......
Slip 5/8" size	0 8	0 7	0 7½	0 7
" 3/4" "	0 9½	0 8½	0 8½	......
" 1"	1 0	0 11	0 11	......

Special Belgian Chimneys—

	Per doz. s. d.
De Grelle Houdret's slip 5/8" size	1 0½ + 10% advance
Ditto 1"	1 3½ " "
DeGrelle's Dupleix quality	1 6 " "

The most popular brand is known as "Ditmar's," which is of Austrian manufacture. German chimneys are not asked for to any great extent as the general complaint in regard to them is that they get frosted. Japanese chimneys, although cheap, are not yet established in popular favour.

(*b*) *Tumblers*—

Description.	Austria. Per doz. s d	Belgium Per doz. s d	Japan. Per doz. s d
½ thin tumblers	0 10	2 0	0 8
3/4 " "	1 1	3 0	0 10
Full " "	1 4	4 0	1 0
Half crystal heavy bottomed			
½ tumblers	......	1 3	1 0
3/4 "	......	1 6	1 3
Full "	......	1 10	1 7

Special Belgian Tumblers—

	Per doz. s. d.
De Grelle's Nespuse design No 2	1 4½ + 10% advance.
Ditto Coloured No. 2	1 4½ "
Ditto Wh...	[illegible]

Thin ice proof tumblers of Austrian manufacture are generally preferred, but great demand also exists for half crystal heavy bottomed tumblers from Belgium and Japan. The latter are more expensive than the Austrian thin tumblers, but being less brittle they last longer.

Toy Tumblers.—These are in four leading designs, the price for DeGrelle Houdret's being 5·3/4d. per doz + 10% advance.

(*c*) *Glass, salt cellars or pots*—Belgium alone used to supply these, but Japanese salt cellars at 3d. per dozen have practically taken the place of the Belgium article. The principal Belgium brand is DeGrelle Houdret's in four shapes at 5¼d. per doz. + 10% advance.

(*d*) *Oil glasses.*—These are used by the poorer classes in places of ordinary lamps, a wick being burnt in the oil contained in

the glass. This article is imported from Belgium and Japan only.

Description.	Belgium. Per doz. d.	Japan. Per doz. d.
Size No. 6	8	5
" " 5	9	6
" " 4	10	7
" " 3	11	8

	Belgium Per doz. d.
DeGrelle's size 0070	8 + 10% advance.
Ditto " 0060	7¼ " "
Ditto half fluted design	9½ " "

(*e*) *Oil burner glasses.*—These are used to burn oil in place of candles in lamps. The supply is obtained from Belgium at 1s. 8d. per dozen.

The best quality of foreign glassware in the market is manufactured by DeGrelle Houdret & Co. in Belgium, and the prices of their glassware are consequently higher than those of other manufacturers.

Glass salt cellars, oil glasses and oil burner glasses being more or less plain articles might be manufactured easily in this country, They are not known by any special brands so that the Indian article would not have to complete with any favourite brand as in the case of most other goods.

A very large business is done in these phials.

(*f*) *Glass stoppered jars.*—

	£	s.	d.		
½ lb. size	4	10	0	per case of	500 pieces
1 " "	4	4	0	"	400 "
2 lbs. "	4	16	0	"	300 "
3 " "	5	6	6	"	300 "
4 " "	4	11	6	"	200 "
5 " "	4	13	0	"	150 "
6 " "	3	10	0	"	100 "

These prices are for German manufacturers of the sizes mostly in demand. Japanese jars are also imported at prices about 33 per cent below the above rates. They are differently packed and the prices go by the dozen instead of per case. A large business is done in these jars.

(*g*) *Glass beads.*—A great variety of descriptions and sizes of glass and imitation coral beads are imported. Austria now sends only imitation coral solid beads at prices ranging from 1½d. per gross to 4s. per gross according to size. The smallest size, at 1½d., is 5 × 5 millimetres and the largest, at 4s., is 15 by 14 milimetres. The supply from Japan consists of hollow beads only, the price varying from 3d. to 6d. per box of 1,200 or 2,400 beads according to size. These beads used to be supplied by Austria. Italian glass beads, known as pound beads, cost 24s. to 30s. per cwt. Italian glass or seed beads cost from 2s. 3d. to 3s. 6d. per bundle of 25 bunches, each bunch consisting of 120 strings each 7 inches in length. Italian beads are said to have largely displaced the French article.

It is stated that owing to the cheapness of labour in Germany, English manufacturers in some cases obtain their supplies from Germany. An example of this has been found in the market in the shape of a chimney bearing the stamp "Hinks." "Made specially in Saxony."

Glass manufacture in India consists of two well-defined classes, the indigenous household industry, which is represented in all parts of the country, is chiefly concerned with the manufacture of cheap bangles. These are of plain coarse glass coloured in a variety of shades and often overlaid with lac and ornamented with tin foil and beads. They have been known to sale wholesale, near the place of manufacture, as cheap as Re. 1 per 3,000 and ordinarily they vary from about Re 1 to Rs. 4 per 1,000. They

scarcely compete at all with the imported bangles and are worn only by the poorest classes. There are, however, possibilities of improvement in the local manufacture of bangles as is illustrated by the Firozabad glass and bangle industry in the Agra district. Firozabad is the centre of manufacture both of crude glass (*kanch*) and of bangles in the United Provinces. It was estimated by Mr. Chatterji in 1908 that two hundred thousand maunds of crude glass were manufactured annually in the United Provinces. A small quantity of locally manufactured blown glass is made from *kanch*, but its main use is in the manufacture of bangles. The small capitalists engaged in the industry were stated by Mr. Chatterji to be well-to-do men and anxious to adopt improved methods. Apart from the crude glass industry, Mr. Chatterji estimated that nearly five hundred furnaces for bangle making were to be found within a fifty-mile radius of Firozabad and quite ten thousand operatives were employed in the industry. The bangle makers were stated to be receptive of new ideas and to have introduced many new forms and colours. At the same time the local types of furnace were pronounced to be defective and modification was required so as to permit the burning of coal as well as wood fuel and a better regulation of the air so as to allow of higher temperatures. Without structural modification of the furnances it was difficult to manufacture articles which could compete with the imported articles in price and attractiveness. Recent enquiries show that the Firozabad industry has had difficulty in securing expert advisers, since Austrian experts employed until a year ago have proved unsatisfactory. Difficulty also may be experienced in securing colouring agents for the glass which until recently have been largely imported from Germany. The questions, however, are being carefully considered by the local authorities and there is every prospect of the Firozabad industry receiving a great stimulus from the present cessation of imports from Austria.

The manufacture in indigenous furnaces of articles of blown or pressed glass from *kanch* or from broken glass purchased usually from the railways, is carried on in various parts of India, for instance at Nagina in the Bijnor district; but the articles which are being produced in the way are very limited. They consist mainly of *kachha* phials. Inkpots, perfume phials, *chiraghs* and some other articles are also made, but the industry can hardly be said to compete with imported glassware except of the very lowest class.

The history of glass manufacture in India on the modern factory system has hitherto been an uphill struggle against great difficulties. In Bengal, the Pioneer Glass Manufacturing Company Limited of Titagarh, started work in 1890 and the Bengal Glass Company of Sodepur in 1898. Both companies brought out experts from Europa and constructed furnaces on up-to-date western lines, but they ceased working in 1899 and 1902 respectively. The Madras Glass Works founded in 1909 has ceased work, though it is hoped to restart it. A factory started in Hyderabad also proved a failure and its plant was taken over by the Glass Works at Ambala. The Himalayan glass works at Rajpur in the Dehra Dun district closed after three or four years working in 1908, but was restarted later under new management. Finally the Upper India Glass Works at Ambala which was

started by Indian capitalists in 1895, was at first a failure. Since 1903, however, when the factory changed hands, it has been much more successful and is now the oldest glass factory working in India. It established itself firmly in its earlier years by specialising in the manufacture of bangle glass ; and in this line it is interesting to record that the bangle glass of Ambala and Firozabad had succeeded in capturing the market, whereas formerly large quantities of glass used to be the imported from Belgium for this purpose. At the present time one or two glass factories only are to be working in India, and a new factory, the Western India Glass Works Limited of Bombay is about to start work.

Records of the earlier ventures have shown that the failures in some cases were due, in part at least, to preventible causes prominent among which were (1) the lack of sufficient fluid capital and the consequent inability of the companies to meet their heavy initial expenses, and (2) inexperience and lack of technical knowledge on the part of the promoters. But there are also certain real and special difficulties which glass manufacturers in India have to contend against. The principal difficulties are—(1) The temperature of India in the hot weather. Foreign experts have failed hitherto mainly in being unable to accommodate themselves to Indian conditions and to regulate the furnaces to suit those conditions. (2) The difficulty of obtaining skilled labour for glass blowing. Both foreign blowers and men from local industries such as Nagina have been tried but neither have been entirely satisfactory. The local glass blower is stated to be very conservative and unwilling to learn. For this reason the manufacture of articles of pressed glass will be easier at first than blown glass. (3) There are considerable technical difficulties, such as the supply of a suitable quality of sand and a suitable alkali. Suitable sands exist in various places in India and the attention of persons interested in this subject is invited to the analysis of various sands in Mr. N. B. Wagle's "Suitability of the Presidency of Bengal for Glass Manufacture" published by the Bengal Secretariat Press in 1906. With regard to the alkali, local sources, such as the *reh* of Northern India, have not yet given results adequate for the manufacture of high class glassware. At present imported bicarbonate of soda is mainly used. As this is imported from England there is no reason to anticipate any shortage of the supply. It is also probable that soda compounds will in time be locally manufactured in India.

It is evident from the above resumé that the establishment of the glass industry in India, especially for the higher grades of glassware, will be a slow and difficult process ; the difficulties mentioned can only be gradually overcome by time and experience, but a foundation can probably be laid in the bangle industry and in the manufacture of the simpler kinds of glass. In the finer types of glassware India can only hope to compete when the industry is organised and developed. Even English manufacturers find it impossible to compete with Austria in certain types of fine cheap glass. A striking instance of this has recently come to notice. The Indian Medical Department used to import annually from Austria a large quantity of fine glass tubes for holding quinine. It has now become necessary to attempt to obtain these from England, but the lowest quotation for similar glass tubes which can

be obtained from England is exactly three times as high as the price previously paid to Austria.

Scientific & Industrial Topics.

The Coal Tar Dyes Industry.

The dyers, cotton mill owners, dealers in reagents and Stains, ink manufactures and others have been put to a great distadvantage owing to the scarcity of the coal tar and other artificial dyes, in consequence of the present European war. These came chiefly from Germany, which is the home of those dyestuffs. The greatest sufferers are the English and Indian dyers and Cotton Mill owners, who drew their supply from that country. So the Manchester men are going to erect a huge national synthetic dye stuff making factory very shortly. We, in India, have coal in abundance. We utilize a small quantity of tar, while a vast amount is wasted or lost. No one has cared to utilize the tar for making the dyestuffs here. It is high time that our dyers, cotton mill owners, gas workmen, and others should join their hands to try to establish a dyestuff factory here for their own benefit and profits. Indeed, we imported dyeing and tanning materials, from Germany alone, to the value of £680,205, in 1912-13, out of which sum, aniline dyes cost us £424,603. With even one tenth of this latter sum alone we can erect such a huge factory that we shall not be in need of importing a farthing worth of dye from any foreign country. Moreover, this industry has so many ramifications for utilizing the by-products, that it is worth our while to work in right earnest. The manchester people have already dealt a death blow to our cloth industry and if they master the situation by erecting a national dyestuff factory now, which they will no doubt do, then adieu to our cherished hopes for reviving the cotton weaving and dyeing industries. We think the capital may be forthcoming, but what we really want is trained experts with technical skill who will be able to conduct and manage this industry. Where are our trained students who have come back armed with the required knowledge from the foreign countries? Let them come forward and join hands with the capitalists and the Government.

The Match Industry.

Our readers are noticing that Swedish matches are becoming scarce and consequently rising in prices. On the other hand the Japanese are trying to win the trade. In 1912-13 the Austrians supplied us with matches to the value of £54,659 and the Germans to that of £22, 350. The figures of Sweden and England are not available. Japan supplied us matches to the value of 1,973,785 yens in 1913. While the total value of imported matches in 1912-13 was Rs. 28,84,457. It is apparent that unless we move in the matter, Japan is sure to win the trade. The following table will convince any one about our assertion. The amount of matches imported from Japan for the past three years were as follows :—

1911	...	1,360,000	Yen
1912	...	1,783,872	„
1913	...	1,973,785	„

It will be seen that her trade is flourishing by leaps and bounds, and yet we are blind to our own industries. We repeat here in this connexion, what we said in Sept. issue : " It has been said that there is no suitable wood in India for manufacturing the sticks and boxes. It is a fallacy. It

are suitable woods in the Himalayan and other regions. A letter to the Indian Forest Research Institute at Dehra Dum will bring you the desired information. Besides these why not use straw for sticks and boxes. A match factory, to be successfully worked, must be divide into two departments: One shall prepare the boxes and stick and the other shall be engaged in actually manufac turing the powder, etc. for the sticks and boxes. The former can be located near the forest and the latter in any town, from which the supply of chemicals, etc may be drawn But if the transport freight is cheap both may be located either in the forest or in the city Besides these, how Japan utilize so meagre kinds of wood and sell their matches so cheaply? They bleach every variety of wood by a special secret process of their own and make them fit for the sticks or boxes Why not our Japan-trained youths, our chemists and scientists carry out some research work in this, whetner of their own accord or under Govt. control? This will go a great way to solve the problem."

A Romance of Accident.

It is well known that picric acid is largely used in explosives, but it is not generally known that it is also largely used in medicine, in surgery, in dyeing, and in photography. A saturated solution is used as a lotion for burns. This is how it was discovered: Dr. Thiery, the famous French physician, was carrying out some experiments in Paris Hospital. He fell asleep in his chair with a burning cigarette between his fingers. It so happened that when the cigarette gradually burnt away, Dr. Thiery suddenly awakened from his slumber by feeling a severe burning pain between his fingers. To his horror he found that his fingers have been badly burnt. There was a beaker full of picric acid solution standing on his experimenting table, and without thinking for a moment he plunged his burnt fingers in it, and lo, the pain disappeared. He was himself astonished and continued to treat the wound with it. He was cured and thence forward it came into use as a lotion for burns. Here is another: A French Scientific paper says "it has been accidentally discovered that in cases of epileptic fits, a black silk handkerchief thrown over the afflicated persons will restore them immediately." So, here is a lesson for hysterical women and their relatives and also for those who always look upon all sorts of accidents as misfortunes. We could have filled a volume of such accidents and their benefits to the various scientific arts. The blotting paper, calico printing, snuff making, and a host of others were discovered by mere accidents.

To Collect Fossil Plants for Museums, etc

Baron Ethtngshausen, the eminent Austrian phylopaleontologist, gives the following simple method for collecting fossil plants.—The lumps of stone supposed to contain the fossil leaves and stems are soaked for six months in water under a pressure of from 2 to 3 atmospheres Wherever a fossil is imbedded, the substance of the stone is not continuous, however compact it may be and these microscopic interstices become filled with water under the soaking and the pressure. The lumps of stone are then taken out and exposed to intense cold, the thin films of water freeze, the stones open of themselves

and expose their long buried contents uninjured. In some instance the soaking and freezing have to be repeated, but the trouble is repaid by the fact that the more compact the stone, the less imperfect will be the fossil. It will be seen that the above process is but a copy of Dame nature's one of the methods of making soil. Rain falls on the mountains and hills and enter into cracks and crevices ; winter sets in ; water freezes and tears asunder the mighty mountains. The above and myriads of other instances will show the difference between a trained scientific eye and the eye of the common man, or, "eyes and no eyes."

To Smokers.

Place a small wad of styptic (cotton saturated with ferric chloride) in the bowl of your pipe, your cigar or cigarette holder and the sulphuretted hydrogen, noxious oils, nicotine, and products of decomposition will be neutralized and eliminated—so says Dr. Thomas in a recent issue of a scientific exchange. By the bye, Melsens, the distinguished French chemist, was of opinion that plugs of simple absorbent cotton or crumbled paper cuttings, will have nearly the same effect and that the users of hookah will do well to change the water everytime they smoke.

Origin of the Thermometer.

According to Sir Samuel Wilkes, Fahrenheit constructed his thermometer from one made many years ago by Sir Isaac Newton. Newton made an instr ment for measuring the degree of heat influids by filling a tube with linseed oil and marking this on the freezing point as zero by putting the tube in ice, and in the same manner the boiling point by putting it in boiling water. Number 12 denoted the bodily heat. After this for convenience the degrees were divided into two making the body heat 24 above zero and the boiling point 53. Many years after Fahrenheit in his instrument used mercury instead of linseed oil and again divided this degrees into four making 212 for the boiling point and 96 for body heat. Finding he could get a lower temperature than freezing he made this point zero which brought the 8 of Newton to 32 Fahrenheit.

To Preserve Fish.

Times without number we have been requested to give a method for preserving fish for transport purposes. We had approached the Govt. Fishery Dept but with no success. Now, our chemist tells us that Prof. Barff's Boro glyceride is an ideal thing for that purpose. Barff's Boroglyceride has been imitated by many makers. The address of the original manufacturer is The Kreochyle Co, Viaduct House, Farringdon St, London, E. C, The article is sold in tubes, bottles and jars. Their prices are 6d., ls. 2/6, 5/, and upwards It is a white, creamlike, nearly odourless, highly antiseptic substance and is used in medicine, surgery, in the toilet and in the preservation of foods. It preserves, among other things, meat, poultry, game, fish, lobsters, crabs, oysters, butter, milk, eggs, cream, cheese, soup, extract of meat, infusions of vegetable substances, wines, jams and jellies, etc., etc. However, following are the processes for preserving fish :—(1) Have

[illegible] cleansed ; wash carefully the gills and interior of the fish with a solution of the strength of one teaspoonful (½ oz. by weight here) of Boroglyceride in half a pint of (warm) water. (2) The fish being cleansed, immerse in a solution—strength one table spoonful of Boroglyceride in three pints of water—for 14 minutes up to 12 hours ; take the fish out, and allow them to drain. Fish so treated will be kept good for periods ranging between two days and a fortnight. It only required to keep the fish from day to day, immerse for 5 minutes each morning and evening.

Reference Catalogue of Books.

Book on Linen.

Linen, by Alfred S. Moore, Re. 1-5.

Books on Advertising.

The Principles of Advertising Management. By Frank Alvah Parsons 6s net. (2) Advertising by G. W. Goodall net 2s. 6d.

Book on Medical Electricity.

Practical Medical Electricity, by Alfred C. Norman, net 5s.

Book on Dairy.

Dairy Chemistry, by Henry Droop Richmond, net 15s.

Book on Models.

Modern Models, by V. E. Johnson, net 1s 6d.

Book on Stamps.

Stamp Collecting by A. B. Creeke, As.

Books on Poultry.

(1) Poultry Keeping, by E. & S. H. Lewer, As 14. (2) Profitable Poultry keeping, by W. H. Bodin, As. 14.

Book on Bee keeping.

Bee keeping for profit, by W. S. Morly Re. 1-5.

Books on Motion Picture.

Motion Picture operation, by H. C. Horstmann & V. H. Tousley, net 6s 6d. (2) Motion Pictures, by David S. Hulfish. Rs. 14-7.

Book on Electro-Plating.

The Elements of Electro-Plating, by J. T. Spragne, Re. 1-5.

Books on Needlework.

(1) Adventures among the Thimble People, by Jane Eayre Fryer, net 6s. (2) The Illustrated Needlework Book, by F. Caufield, net 3s. 6d. (3) The Cult of the needle. By Flora Klickmann, As. 14. (4) Knitting, by M. A. Metcalf, Rs. 10-15.

Directory of the World.

MacDonald's Directory and Gazetteer, 1914 15, net 21s.

Catalogue of Stamps.

Stanley Gibbons' Priced Catalogue of stamps of the British Empire, 1914 15 Part I net 2s. 6d

Book on Palmistry.

Cheiros' Language of the Hand, net 10s. 6d.

Book on Chutneys.

Indian Chutneys, Pickles & Preserves, by L. V. Re. 1-5.

Books on Beet Sugar.

(1) Beet sugar manufacture, by H. Classen. Rs. 10-15. (2) Evaporation in the Cane & Beet sugar manufactory, by Edward Koppeschaar, Rs. 6-9. (3) Sugar Cane & Beet, by George Martineau Re. 1 5. (4) The Technology of Sugar, by J. G. McIntosh, Rs. 9-3, (5) Sugar, by J. A. R. Newlands & E. R. Benjamin, Rs. 21-14. (9) Beet sugar making and its Chemical Control, by Y. Nikaido, Rs. 10-15. (7) Beet Sugar manufacture & Refining, 2 vols. by Lewis S. Wara, Rs. 33-4.

Book on Onions.

The new Onion Culture, by T Greiner, Rs. 2 3.

Book on Peas.

Peas & Pea Culture, by G. S Sevey, Rs. 2-3.

[All the above books can be had of D. B. Taraporevala, Sons & Co., Bombay. Kindly mention "Industry" when writing to them, for prompt attention and careful despatch.—Ed. I]

Reference Directory.

Book Binders' Machinery.

(1) Saranac Machine Co, Benton Harbour, Michigan, U. S. A. (2) The Smyth Manufacturing Co, 9, Sigourney St., Hartford, Connecticut, U. S. A.

Candle Moulding Machinery.

Homan & Co., Findlay St., Western and Hulbert Avenues, Cincinnati, Ohio, U. S. A

Paperbag Making Machinery.

Remington Machine Co., Wilmington, Delaware, U. S A.

Shoe last.

Kimball Bros. & Sprague, Brockton Mass, U. S. A.

Confectioners' Machinery.

Thomas Mills & Brother, 1301, N Eighth Street, Philadelphia, Pennsylvania, U. S. A. This firm also supplies Bakers', Ice cream makers, and Druggists' machineries.

Wire nail making Machinery.

The National Machinery Co, Tiffin, Ohio, U S A,

Incandescent Mantles.

(1) Edward Miller & Co, Meridan, Conn. (2) Walsbach Co, Gloucester, New Jersey. (3) Genl Gas Light Co. 46, West Broadway, New York City. All of U. S. A.

Musical Strings.

National Musical String Co, New Brunswick, New Jersey, U S A.

Oil Cloths.

(1) The Nairn Linolium Co, Newark, New Jersey (2) Standard Oilcloth Co, 320, Broadway, New York City (3) Trenton oilcloth and Linoleum Co, 41, Union Square, New York City. (4) Tower Mfg & Novelty Co, 326-328-330, Broadway, New York City. All of U. S A This firm also supplies stationery, ink fancy goods, photographic materials, toys, games, office furniture, rugs, carpets, etc.

Paints & Colours

( ) S. Bowen's Son, Fourth Street and Sedgely Ave, Philadelphia, Penn. (2) Felton, Sibley & Co., 136, N. Fourth St., Philadelphia, Penn. (3) Samuel H. French & Co., Philadelphia, Penn (4) Geistendorfer Bros., New York City. (5) Hildreth Varnish & Co., 90, West St., New York City. (6) John Lucas & Co., 321, Washington St., New York City. (7) Puritan Soap Co., Rochester, New York. All of U. S. A.

Type-writer Papers.
(1) American Ribbon & Carl on Co., 244, Mill St., Rochester, New York. (2) F. S. Webster Co., 332, Congress St., Boston, Mass. Both of U. S. A.

Carbon Papers.
The Carter's Ink Co., First and Athenaeum Street, Cambridge "C," Boston, Mass., U. S. A. This firm also supplies inks of all kinds, fountain pens, glue, cement, typewriter ribbons, etc.

Pearl Specialities.
The Van Winkle Pen Co., Franklin, Penn., U. S. A.

Playing Cards.
(1) United States Playing Card Co., Cincinnati, Ohio. (2) The New York consolidated Card Co., 222-228, W. 14th St., New York City. Both of U. S. A.

Safety Pins.
Oakville Co., Oakville, Connecticut, U. S. A.

Enamel, Porcelain & Electrical Advertising Signs.
The Federal Sign System Co., 503, Home Insurance Bldg., Chicago, Illinois, U. S. A.

Caustic Soda.
The Pennsylvania Salt Mfg Co, 115, Chestnut St., Philadelphia, Penn., U. S. A.

Notice & Reviews.

A Manual of Tea Cultivation.
We have the pleasure to receive this elementary treatise by Mr. Abinash Ch. Dutt, of Mahmuda Tea Estate, Eastern Cachar Tea Co., Ltd. The author has passed a good portion of his life with his father in this particular branch and so his opinions are worth considering. Though the book is only of 48 pages, yet one is struck with the useful and practical matter it contains and in such a condensed form. The book will not only help the novice to have an idea of the subject but will be of use to many enlightened planters as well. The practical side of tea agriculture, of manuring and of teapests have been admirably treated. We hope that the book would have a large sale.

Brief Queries & Replies

The Laxmi Trading Co., Botad, Kathiawar,—Beg to inf rm that they are ready to appoint the following querists as their agents for the Dubied Knitting machines, Pauma Bookrest, Dr. Pierce's Toothache wax, and Bromide Enlargements :—S. D. Bhandari & Co., Hafizabad ; S. B Banerjee, 30, Hari Ghose's St, Calcutta ; K S. M., Udaipur ; R Khan, D. G. Khan, S C Barooah, Dibrugarh ; and M. R. Ahlowalia, Ambala. Informs M. A. K., Lyallpur to correspond with American Industries 30, Church St., New York, Ill., U. S. A., for starting an Independent Pen making factory. Informs N. C. M, Sorath, that they can give him knitters on hire purchase system. Begs B. P. Shukla, Bareilly, to send them samples of canvas slippers with wooden soles You can get the sunflower seeds from any seedsmen or florists. They beg to inform the public that Messrs Edward Dubied & Co, have invented a reading bookrest for reading in bed or on sofa, in a sitting or incumbent position, which has just been imported here and the price of which is Rs. 50 net, free delivery Bombay Harbour. This can be had from their branch office, the address of which is The Laxmi Trading Co., 47, Parvati Mansion, Grant Road, Bombay No. 7. They shall be pleased to represent Manufacturers and to appoint agents.

J. D., Ghatkopar —Kindly consult the names of books and journals on Toy making, which have already appeared in our previous issues. The addresses of the dealers in slotting machines have appeared on page 149 of Oct. 1914 issue.

P. K. A., Woriur.—Wants to know how sweet chewing tobacco is prepared. The addresses you want have already appeared. Yes, there are vegetable and animal tallows. The former is dearer but superior. Can any one lend him the back volumes of *Industry* for a few days ?

K. A, Kurachee.—It is a pity that you have not seen our replies to your queries at the top of the second column of page 138 of Sept. 1914 issue.

J. C. P., Karachi.—For the thermometer write to the Bengal Chem. & Pharm. Works, Ltd., Calcutta. The Company you name has ceased to exist. Write to Thakur Chand and

Hotchand Bros., Sukkur, Sind, or to G. N. [illegible] for rubber stamp making outfits. Have you read the article on sealing wax in Vol IV? There is no such special treatise on the subject. To what purpose would the banana juice be put?

S. R. D., Balaghat.—For the books you name please write to D. B. Taraporevala Sons & Co., of Bombay. We have not received your previous query about catechu as you speak of.

Roll No. 983, Ramasagara – It is very difficult to arrange such matters at present. Can any one suggest what can be done with the fruits of prickly pear and Hungatree? Can anybody teach him astrology by correspondence?

R. S. I, Madura – Can any body say how the white colour of candles is produced when made from parafin wax alone?

I. P., Koondi.—Why don't you write to the various companies who deal in knitters and whose addresses appear in the Buyers' and Sellers' Guide Section?

M. D. G., Savantvadi —We mean the Bulletin of the Imperial Institute of London. For the books and journals named please write to J. B. Lippincott Co. East Washington Sq.. or to P. Blakiston, Son & Co., 1012, Walnut St., both of Philadelphia, Penn., U. S. A.

P S R. Udipi.—Communicate with the Director of Industries, Madras, for date sugar cultivation. Can any one give him particulars about starting a lottery club? The required machineries can be obtained from Blair Campbell and Machean, Ltd, Woodville St., Govan, Glasgow, Scotland.

Bindahnee Medical Hall, Kemmendine. The samples of Dr. Ross' Life Pills which you sent are too small for finding out its true properties. But they should have been sent to any medical man rather than to us.

V. G. V., Perambur.—If you have not recieved any information from the Pusa Agricultural College, please communicate with us again.

K. N. N., Puttur.—Write to V. K. Ranade, Girgaon, Bombay, for your requirements.

K. M. P., Bombay.—[illegible] not do. Buy such a bandage from [illegible] & Co. of your city and find out for yourself. The address you want has appeared on page 156 of Oct 1914 issue. Have you read about an accumulator on page [illegible] April 1914 issue? No huge machineries are required for making carbon papers. The purple carbon paper manufactured by the Remington Co., Ltd, may or may not contain tallow or any other oily substance. If they contain such things, the papers are so dried that they do not leave any trace of them. But our chemist believes that they use grain soap in place of tallow or oil. Grain soap is not easily procurable in India.

N. G, Bhagalpur —Wants to know how Bishnupur and Gaya tobaccoes and zardas are made.

P. C. M., Mayavaram.—What kinds of ballons do you mean? The dirigible balloons, the toy rubber ballons, or the fire-ballons as prepared by the pyrotechnists?

A C. N., Rawalpindi.—What do you mean by Hairfixture?

(Illegible), Hole Narsipur.—Kindly give your name legibly. The addresses you want have already appeared. H. B. informs you that the address you want is K. Narayan Bhat, vill & P O Karkal, Mangalore, South Canara.

Y. D. B., Guzrat.—Wants the addresses of poultry farmers of India and abroad.

C. K. G. I., Kunnamkulam.—Please communicate with the publishers of the book. A firm can teach you fire work making by correspondence for Rs. 8 only.

(Illegible), Larkana —Re: Vinegar making. Use plain pure water in place of rain water. Kindly write your name legibly.

K. R. R., Khargone.—The addresses of dye dealers and names of books on dyeing have already appeared in our previous issues.

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People Ed.

Registered No. O. 588.

Industry

CONTENTS

Vol. V.
No. 60
March
1915

Royal Ed. Rs. 2-8 People's Ed. Re. 1-8 yearly.

With this issue the V Vol of "Industry" is closed. With the next we shall commence the VI Vol. As usual we shall send the next issue by V.P.P. to realise the subscription of the next Vol. Those who may be unable to accept the V. P. P. will kindly communicate early quoting his Roll No. We expect every one of our readers to accept the V. P. P.

Industry

People's Ed.

Monthly Journal of Handicrafts & Commerce.

VOL. V. CALCUTTA, MARCH, 1915. NO 60.

Our New Programme.

By the grace of the Providence and by the kind help and patronage of our numerous readers we are completing the Fifth Volume of INDUSTRY with this issue and with the next we shall commence a new volume with a new programme - new ideas and new arrangements. We have tried our best to give our readers as much information on subjects we treated as can be collected; through our query department we answered a very considerable number of industrial enquiries. From the numerous appreciative letters we received in the course of the year we may congratulate ourselves on our being helpful to our readers. Yet none is more conscious of our shortcomings than we ourselves are and it is our earnest endeavour always to remove those shortcomings as much as we can and to be more serviceable to our readers, much more than we hitherto had been.

We are working with INDUSTRY for the last five years—continually working with a view to be of the greatest utility to our readers, and it is always our endeavour to be of personal service to every one of them. We have been led to feel we have a mission to fulfil; we believe with Ruskin that "God gives us always strength enough and sense enough for everything He wants us to do." Our strength lies in our readers—the more the stronger we are to serve; our sense,—the inspiration to be of increasing service—lies in the appreciation of our readers. We have, by special endeavour of the readers who came to consider *Industry* their own personal handiwork as if, enough of both—yet we seek for more—more of our readers, an increasing circle of it and more inspiration from our readers—to give us more strength to fulfil our sacred mission of service.

We had to encounter many difficulties hindering our progress. The Continental war came on at a time when our stock of paper was nearly running out and the considerable rise in price of the kind of paper we were using put us to much embarrasment. Unlike our other contemporaries, we have to experience the stoppage of the increase of our new subscribers and as we

count among the traders of the country the majority of our patrons who have been the greatest victims of the war in India, we had to increase our expenses in our query department in finding out new channels of trade for our trader-readers. The result has been that we have been compelled to allow inferior quality of paper to some inconvenience of our readers.

Everyone of common sense will know that it is impossible to give so much original and technical matter in the paper for Re. 1-8 per year and to make profit at the same time. It is not our intention to make profit out of *Industry* but it is our endeavour to put in as much improvement in the paper as possible and any rise among our subscribers will be the cause of increased efficiency of the paper to the advantage of the readers.

From the next issue we commence a new volume with a new programme—a new motive which connects us with the material improvement of the Indian populace generally. A series of inspiring articles will form a running feature--giving whispers of inspiration from the great men of the world. Review of our district indus ries will be another feature—this will open out a new and wide vista of activity among our countrymen and show the way to new and lucrative employments. Special articles giving industrial and chemical lessons, as usual, will remain a chief feature but practical sides of industrial possibilities will be more fully treated. The queries will have improved rendering, and preparations are being made for supplying more elaborate and complete answers to them. To our trade subscribers, we shall in the next year give opportunity of advertising in special column at a minimum of as. 4 per issue only—an advantage which we hope will be appreciated by those who will have occasion to avail themselves of it.

We have hitherto conducted the paper with a view to educate public mind to Industrial needs of the country and to show means to fulfil them. Henceforth besides this it will be our endeavour to help the readers to decide upon a fixed aim in life—an aim which will always be kept before the mind's eye as the end to reach in life which will determine every action, and with a decided impetus lead a life to happiness. It is indeed a curse in those who have nothing definite to persue nothing particular to struggle for. You must have something to overcome—if not, you must create for yourself some definite pursuit to labour for—you must have lofty ambition and loftier desire to achieve it. Henceforth it will be our object to show our readers definite ways to form ambition, definite means to accomplish it, through many contending forces and obstacles: we shall reveal to our readers' eyes how the man of affairs in the world has faced and overcome obstacles and by dint of patience has crowned his achievement with success, how from the world of chaos has concentrated possibilities of powers and turned powers into achievements.

We shall be glad to hear from our readers how our efforts of the last year have been profited by them and we shall be very glad if our readers come forward to co-operate with us, by suggestions and active help as far as possible, in improving the subject matters of the paper and increasing the circulation. We want our dear readers to consider "Industry" their own and work for it as such while we are always ready to serve them as far a lies in our power.

A New Source of Carbolic Acid.

Carbolic acid or Phenol has a very wide range of uses in surgery, in medicine, in the arts and manufactures, and in the manufacture of high grade explosive compounds. For this last reason the import and export of carbolic acid have been forbidden by law as long as the present European War will last. It is principally obtained from coal tar, but as there is no manufactory in India for utilizing the products of coal tar, it is high time that we should find out some way for manufacturing the carbolic acid. A new industry will thus spring up, it will give bread to many men and will help various arts and manufactures.

But the question may naturally be asked "how are we to manufacture it"? The answer is old enough: "utilize your own natural raw resources."

Mr. Broughton, the late Govt. Quinologist, in a report to the Madras Govt. dated January 1871, and which was quoted in the Pharmacentical Journal's October issue of the same year, drew the attention of the public to wintergreen oil as a source of Carbolic acid. Oil of wintergreen is obtained from a Canadian plant, *Gaultheria procumbens.* But there is a plant in the Nilgiris in India, called Indian wintergreen, *Andromeda Leschenaultii* (Dec.), N. O. Ericacea, which can be utilized for procuring the oil and from which phenol can be manufactured. The oil is identical with the Canadian oil. We cannot help quoting Mr. Broughton's admirable remarks.

"The oil from this Indian Source," says Mr. Broughton, "contains less of the peculiar hydrocarbon oil which froms a natural and considerable admixture with the Canadian oil, and therefore is somewhat superior in quality to the latter. The commercial demand for the oil is not, however, considerable enough to make its occurrence in India of much direct importance.

"It occured to me in 1869," he continues, "that methyl salicylic acid would, however, under suitable treatment, furnish carbolic acid according to a decomposition described by Gerhardt. After a few experiments I was successful in preparing considerable quantities of pure carbolic acid.

"The method of manufacture is as follows:—The oil is heated with a dilute solution of a caustic alkali, by which means it is saponified and dissolved, methyl alcohol of great purity being liberated. The solution of the oil is then decomposed by any mineral acid, when beautiful crystals of salicylic acid are formed. These are gathered, squeezed, and dried. They are then mixed with common quicklime or sand, and distilled in an iron retort; carbolic acid of great purity, and crystallising with the greatest readiness passes into the receiver.

"This acid is equal to the purest kind obtained from coaltar, and employed in medicine. It, of course, possesses all the qualities which have rendered this substance almost indispensable in modern medical and surgical practice and in the manufacture of high explosive compounds.

"I had hoped, from the inexhaustible abundance with which the plant grows on the Nilgiris, that the carbolic acid from this source could be prepared at less cost than that imported. I have not yet had an opportunity of working on a large scale with an itinerant still, as would be necessary for its cheapest production; but from some calcu-

lations I have lately made, I am led to think it can scarcely be prepared for less than the price of that procured from coal tar. The purest kinds from the latter source cost 4s. a pound ; I estimate the cost of that from this indigenous source at from Rs. 2-8 to Rs. 3-8 (5 to 7s.) per pound *in this country*.

"The carbolic acid from the same source has certain advantages over coaltar acid, consequent on its extreme purity. It is less deliquescent. and cannot possibly be open to the suspicion of contamination with certain other products of coaltar which possess injurious qualities.

"In conclusion, I am led to the belief that it would not be advisable to prepare carbolic acid from this singular source, when the comparative cost shows that the gain must be very small or non existent. But it appears to me well worthy of record, that should circumstances render the supply of the English product difficult or uncertain, as in the case of war, or the English price increase, a partically inexhaustible source exists in this country (i. e. in India) from which this indispensable substance, in its purest state, can be obtained at a slight enhancement of the present price."

It is nearly half a century that Mr. Broughton wrote that and no one has cared to pay adequate attention to the subject it really deserves. Times have changed—44 years is a long period ;—the science of chemistry has revolutionized many art manufactures, facilities for transport have increased, and to crown all, when the very opportune moment, in view of the war, when export and import of this very substance is strictly prohibited by law, is at hand, it would be mere madness to let slip this opportunity of establishing this new industry, which shall open up various ramifications, and thereby benefitting the country at large. Well, scientific savants and capitalists are you going to act at once or allowing the remarks of Mr. Broughton to remain a dead letter and going to sleep in lethargy again ? Do we appeal in vain ?

Copying Pencils.

We paid a visit to the sample Exhibition at Commerce and Industry Buildings, Calcutta, and were amazed to see the various Indian, Japanese, Austrian and German goods. Naturally our eyes fell on pencils, because we think that, next to matches, it is the most useful and saleable little thing. We were disappointed too much. The Indian pencils can't compete with the foreign made ones, either in price or in quality. The Japanese pencils, we found out, are the cheapest in the market. Now, as everybody knows that the Indian Pencil Industry is lagging behind for want of good graphite and wood. Kaolin has been found in India and is now worked. Graphite has been worked in Travancore by an English firm on behalf of the Morgan Crucible Company of Battersea. Travancore graphite is suitable for making crucibles but not for pencils. Because it is difficult to grind to a fine powder. In any case, the Travancore mines have been abandoned for the last two years, mainly it is believed because of the increased depth of mining and the decreased yield. Graphite schists of a similar nature also occur in Tinnevelly, as also in the Chattisgarh Feudatory States, notably in Kalahandi. Specimens of Kalahandi graphite sent to the Imperial Institute, London, were unfavourably reported on, largely

owing to the fact that the graphite is not flaky and contains a fair percentage of deleterious matter. The material might be capable of treatment by efficient washing. The Geological Survey of India is in possession of specimens of the Kalahandi graphite and would be able to supply small quantities for experiment. Micaceous graphitic schists also occur near Lohardaga and Daltonganj. There are also extensive deposits of graphite, like that of Travancore, in Ceylon. The Indian Pencil Industry has, therefore, been compelled hitherto to import its graphite from Europe.

As to wood, no substitute has been found for cedarwood of which the German and American Pencils are made. The Indian Forest Research Institute at Dehra Dun has considered this question on several occasions since 1908 and has had a number of promising woods tested by pencil-making firms. The latest conclusions at which they have arrived are that the best timber procurable in India, so far as has been ascertained up to the present, is "Juniperus macropoda." Another useful timber is "cupressus torulosa" which is much more plentiful than the former, but does not make up into so good a pencil being somewhat tough. There are several other timbers which make up into low grade pencils, such as Holarrhena Antidysenterica, Wrightia tomentosa, Wrightia tinctoria, Podocarpus Neriifolia and Cedrela serrata. There is also a kind of soft timber in the Mysore forests.

Now, in the Exhibition we found the ordinary defects of the Indian pencil are that the wood is difficult to cut and the "lead" is too hard. In the cheaper grades of pencil the pencil manufacturer has now also to face apanese competition. We also saw some white and coloured crayons of a Punjab firm, copying pencils, "back lead" pencils, etc. Now, we thought that if graphite is available why not make copying pencils? They have a large sale. The above list of woods is given and any one can undertake to make copying pencils. And as to conclude our remarks we give here two processes for making the same.

Pencils made to produce marks from which copies can be obtained in an ordinary copying ss, have usually the disadvantage that, consisti mainly of aniline, the colour of the copy fades very soon. Gustav Schwanhauser overcomes this difficulty by doing away with aniline altogether. He prepares the pencils as follows :—10 lbs of the best unfermented logwood are boiled repeatedly with 100 lbs of water and the decoction so obtained is evaporated down to 50 lbs. The liquid is heated to the boiling point and small quantities of the nitrate of chromium added, till the bronze coloured precipitate formed at first is redissolved in a dark blue colour. The liquid is now evaporated to the consistency of a syrup, and the finest levigated fat clay is added in the proportion of one part of clay for every 3 or 3½ parts of the extract. To form a good mass to manipulate, a little mucilage of gum tragacanth may be used. The quantity of nitrate of chromium must be in the proportion to the extract, as a surplus prevent the easy solubility of the mass for copying purposes. After the mass is made, thin strips or rods are made of it. They are dried and afterwards fitted and glued into wooden cases. The writing furnished by these pencils is easily transferable ; it is of a penetrating jetblack colour. Alkalies and acids have no effect on the ink.

Faber's pencil for copying writing or designs is made of different degrees of hardness, and is stated by the inventor to combine all the advantages of the very best lead pencils. Four kinds are manufactured by Faber No. 1, very soft; composed of 50 parts of aniline, 37.5 graphite, and 12.5 Kaolin and a littie water. No. 2, soft; 46 parts aniline, 34 graphite, 24 Kaolin and a little water. No. 3, hard; 30 parts aniline, 30 graphite, 40 Káolin and a little water. No 4, very hard; 25 parts aniline 25 parts graphite, 50 koalin. These materials are pounded and mixed with the greatest care and afterwards made into a paste with cold water. After the paste has been well worked and rendered perfectly homogeneous, it is passed through a wire screen, which divides it into strips of suitable dimensions. These are dried in an ordinary room, and afterwards fitted and glued into wooden cases like common lead pencils. These pencils may be ured like ordinary copying pencils for the reproduction of writing or designs. A sheet of thin paper wetted is laid over the sheet to be copied, and the details are gone over with the copying pencil. The action of the moisture on the aniline in the pencil gives a deep tint to the tracing, resembling that of ordinary writing ink.

Concrete Working.

Concrete and Reinforced concrete are used extensively now a days for building purposes, but very few people have attached any importance to the subject it deserves. It is easy to make and there is no reason why we shonld not our own concrete.

MATERIALS.

Cement is the main ingredient required for concrete making. It should be of the best procurable quality to ensure good and lasting work in concrete construction, the use of a cheap and probably adulterated and defective material being disastrous, and much more costly in the end; therefore the best English Portland Cement should be used.

AGGREGATES.

The following materials are *unsuited* for making good concrete, and their use should be avoided if possible; loamy or argillaceous sand; very fine sand; such as "blown" sand; fine sand; road or ditch sand; impure sand or stone, i. e., that which is covered with scale, slime, humus, or is in a dirty damp condition; sand or stone impregnated with sewage or nodular grained sand or stone; stone or sand from soft sandstone rock; sand which is dull, murky or opaque; stone or sand with a surface very smooth or polished; stone or sand that has lime scale or calcareous matter attached to it; pit sand with a few exceptions; soft stone, or sand with soft grains; shell sand or broken shells.

Aggregates that make good concrete are: stone or sand from quartz rock and granite chips; stone or sand from hard sandstone or other hard rock; split sea beach stones, if they have not very smooth surfaces; all very hard angular and rough faced stone or sand; sea beach shingle and sand, if not nodular and polished from mechanical attrition; sand from a river whose bed and watershed are rocky, – preference being given to that found along the course of the river and not at the mouth; sand with large grains of equally coarse and rough, use the larger grained sand; sand with coarse and rough grains in the case —of sand of grains of equal size, use the coarser or rougher; sand which is clean clear and translucent; the hardest

stone or sand available; the stone or sand should be angular and fragmentary in form; the surface of the stone or sand should be rugged and coarse; stone broken from pieces of hard rock by a machine, the powder being removed; sand obtained from hard rock crushed by machinery, the dust being removed; sand or stone obtained from rock which is the most durable.

PROPORTION OF INGREDIENTS.

A watertight cament cannot be produced unless the cement which is supposed to set watertight entirely fills the interstices of the aggregates and encircles them. A satisfactory concrete can only be obtained by the cement being properly apportioned to the sand, and the mortar so formed to the stone, or gravel, or aggregates.

A simple method of ascertaining the quantity of cement required is as follows: Shake or ram down the stone or gravel into a watertight box or measure of known volume, filling it completely. Then add as much damp sand as possible, shaking it down among the gravel, gauging the quantity used. Finally pour in as much water as the mixture will contain; the quantity of water gives the net cubical contents of the cement required, a quantity which should be increased by ten per cent., to allow for imperfect amalgamation, which cannot be so complete as with water, to allow for any defects in mixing, and to ensure that all the interestices of the sand are filled with cement.

To ascertain the volume of sand required, tightly fill a measure with the stone, and fill up with water; the volume of water required to do so being equivalent to the cubical content of the interstices which should be filled with sand.

It should be noted that in dealing with concrete all measurements are usually given in volumes. A mortar of two of sand to one of cement is commonly employed in good work, but for exposed work in deep water a mixture of one and a half of sand to one of cement should be employed, as experiments have proved such a mortar will make a concreate sufficiently impervious to resist pressures of 30 lbs. per sq. inch.

It is customary to designate the proportion of the aggregate in multiples of the cement, which is used as the unit of measure. Thus a 1 : 2 : 5 mixture consists of 1 part by volume of cement, 2 parts of sand, and 5 of stone or gravel.

SIZES OF STONE OR GRAVEL.

In order to obtain an ideal concrete the materials composing the aggregate should be of varying sizes from the largest stone to the finest sand. such proportions being used as will produce the most compact mass. For reinforced concrete, the broken stone or gravel ought never to exceed a size that will pass a 1¼ inch screen, and when the reinforcement is closely spaced, it ought not to be larger than that which will pass a ½in. screen; a usual size is that which will pass a 3/4 in. screen.

MIXING.

The points to be insisted on to secure a good mixture are (1) Exact measurement of materials; (2) thorough mixing till the colour and consistency of the mass are uniform throughout; (3) the use of the correct quantity of water; (4) the concrete should be mixed as near as possible to the work.

The cement, stone, and sand should be mixed first until of a uniform colour throughout, and then the water added from a can

with a rose spout, the mass being steadily turned over at the same time. When the required amount of water has been added, the concrete should be thoroughly mixed with the shovel. If this article proves of any value to any of our readers, we can treat with Coke Breeze concrete and Reinforced concrete or Ferro Concrete in a separate issue of the next volume.

Pen Metal.

Well, many men are making nibs and pens now a days but almost all of them are very bad. This is due to lack of knowledge. Besides ordinary writing nibs, there are costly nibs of gold, platinum, etc., which are used for fountain pens. Hardly any person knows that there is such an alloy, called Cooper's Pen Metal, which are used for making pens, etc.

This alloy is especially well adapted to the manufacture of pens, on accout of its great hardness, elasticity, and power of resistance to atmospheric influences, and would certainly have superseded steel if it were possible to produce it more cheaply than is the case. The compositions most frequently used for pen metal are copper 2 parts ; platimum, 8 parts ; silver, 6 parts ; or copper, 12 parts ; platimum, 50 parts ; silver, 36 parts. Melt the platinum, then throw in copper and when melted then add the silver. When well mixed, pour into suitable oiled moulds. Pens have been manufactured consisting of several sections, each of a different alloy, suited to the special purpose of the part. Thus, for instance, the sides of the pen are made of the metal just described ; the upper part is of an alloy of silver and platimum, and the point is made either of tiny cut rubies, or of an extremely hard alloy of osmium and iridium, joined to the body of the pen by melting in the flame of the oxyhydrogen blowpipe. The price of such pens, made of such expensive materials, and at the cost of great labour, is, of course, exceedingly high, but their excellent qualities repay the extra expense. They are not in the least affected by any kind of ink, are most durable, and can be used constantly for years without showing any signs of wear. The great hardness and resistance to the atmosphere of Cooper's alloys make them very suitable for manufacturing mathematical and scientific or surgical instruments where great precision is required. It can scarcely be calculated how long a chronometer, for instance, whose wheels are constructed of this alloy, will run before showing any irregularity due to wear. In the construction of such instruments the price of the material is not to be taken into account, since the cost of the labour in their manufacture so far exceeds this.

Rubber Toys.

In making ordinary hollow rubber balls, the sheet of prepared rubber is cut into pieces with rounded sides and two points (double convex) three pieces usually going to a ball. The edges are wetted with rubber solution (rubber dissolved in naphtha) and the joints pressed firmly together. When this is done, there is little resemblance to a ball, the article being more like a large Brazil nut. Just before closing the last opening, a small quantity of carbonate of ammonia is put inside, this substance giving off a vapour when heated, the vapour having sufficient force (in confinement) to force out the walls of the ball to a round or any other shape desired. After this substance is inserted,

the opening is closed making the intended ball air tight. The rubber article is now put into an iron mould of the size and shape of ball required, and the moulds are packed in frames to go into a vulcaniser. Iron rods are used to keep the moulds in place and closed in the frames. Care must be used in this, as when the heat is felt considerable force is exerted in the moulds and quite a heavy and well made frame is required to resist this. If a mould gets out of place, there will be some risk, and the work of the whole frame will be spoiled. On afterwards coming out of mould, each ball will be found of perfect shape with no visible marks, or joints except a slight ridge due to the joint in the mould itself. This ridge is ground off with a stone used for this work. Hollow rubber animals and dolls are made in the same way except that the cut pieces of sheet are of different suitable shapes, and the moulds differ accordingly. Some makers instead of carbonate of ammonia use ammonia water or even plain water. the heat of the vulcaniser being sufficient to covert water to steam. The moulds, too, can be made of Plaster-of-Paris, if only one or two specimens are required.

The rubber sheet used for toys is seldom, if ever, pure rubber. 'Fillers' are used in the manufacture, these being a powdered adulterant, such as zinc sulphate, calcium sulphate, chalk, clay, talc, magnesia, silica and barium sulphate. Sulphur is invariably added for the vulcanising effect.

The painting of rubber toys is done with spirit varnish in which suitable colours have been mixed. Oil paints must not be used, as oil has a destructive action. This painting is, of course, purely decorative and external. If a coloured rubber is required, the pigment is added in the manufacture of sheet material.

Mineral Wealth of India—II.

(*Concluded from page 232*)

ALUMINIUM.

Of aluminium there is unfortnnately nothing to be said. The deposits of bauxite in the Central Provinces have been prospected to a considerable extent and some areas have even been taken up for mining purposes, but so far there has been no production of either alumina or of the metal. The possibility of establishing a successful industry has been frequently urged in the publications of the Geological Survey, but local capital has not been forthcoming and those who have attempted to find capital abroad do not appear to have met with success that the quantity and accessibility of the raw material would seem to warrant.

MANGANESE.

Of manganese there is little to be said except that the record is one of steady progress in production, which has risen in the interval with which I am dealing from a little over 300,000 tons to over 800,000, until India has become, with the possible exception of Russia, the greatest producer of manganase-ore in the world. Unfortunately, however, the trade is almost entirely an export one, the ore being exported in its crude state and only a very small quantity being employed in India. It has been pointed out more than once in the publications of the Geological Survey that there ought to be room for the establishment of a profitable industry for the manufacture of ferro-manganese in India.

NEW INDUSTRIES.

Although, of the four metals chosen by Sir Thomas Holland as bases of posisible

industries, progress has been marked only in the case of two, considerable development has taken place in directions which could not have been anticipated so long ago as 1907, and the establishment of certain new industries of considerable value marks distinct progress in the mineral development of the Indian Empire. The lead mines of Bawdwin in the Northern Shan States, the tin and wolfram deposits of Lower Burma, and the monazite sands of Travancore have all provided new industries resulting in an annual outturn worth over a quarter of a million sterling. Although theBawdwin lead industry was orginally founded with a view to the treatment of rich lead slags, containing also considerable quantities of silver and zinc, which were left by the Chinese miners who formerly mined and smelted the ores, futher development is is now being carried out in the mine itself, and it is to be hoped that this may result in the establishment on a sound basis of a lead-mining industry in Burma.

WOLFRAM AND MONAZITE.

Two other minerals to which I have just referred, wolfram and monazite, have only quite recently been discovered in any appreciable quantity in this country, but they already form the basis of industries which promise to be of considerable extent and value. They both command high prices, since, although both are fairly widely distributed in nature they are rarely found in sufficiently large quantities for profitable explotation. Thus the present value of wolfram concentrates carrying 65 per cent. of tungstic trioxide, WO_3, is about £100 per ton, while the monazite concentrates of Travancore are valued at between £35 and £36 per ton and are probably worth more.

ADVANCED METHODS NEEDED.

In India, wolfram has been found in various localties, but hitherto with one exception in only small quantities. In the Nagpur district a few hundred-weights have been extracted from quartz veins traversing the Dharwar rocks of Agargaon, but the deposit has shown no signs of being more than insignificant. In Trichnopoly district isolated specimens have been found at Kadavur and Ururakarad. The most recent discovery is that of a deposit in Rajputana at Degana on the Jodpur-Bikaner Railway. The ore occurs with quartz and biotite in veins traversing granite and although no evidence of a large deposit has yet been obtained, the result of such investigations as have been made is sufficient to warrant thorough prospecting of the locality.

Although the expansion of the wol-fram-mining industry in Burma has been extremely rapid and the profits very great, the methods employed in exploitation have for the most part been of the most primitive description. In addition to the quartz-wolframite lodes, float deposits provide a certain amount of ore, but the greater part is obtained from the lodes, which are usually worked by quarries and open-cut workings some times of a highly dangerous nature. The labourers are to a large extent Chinese and Telegus, with a sparse scatering of Burmese, who do not as a race take kindly to hard work of the kind involved in mining. The ore, when won, is with few exceptions crushed by hand and panned or sluiced. Concentrrting machinery is almost unknown but it will no doubt soon be introduced more generally, for the primitive methods at present in vogue are wasteful and must result in premanent loss, since much of the ore now left in dumps and tailings will for economic reasons be

ultimately irrecoverable. Hitherto most of the wolfram produced in Burma has gone to Germany for metallurgical treatment; the industry has therefore been considerably disturbed during the last few months, but inquiries for wolfram were being made in London in December and the check to the industry will no doubt be merely temporary and of no serious importance.

SULPHURIC ACID.

Turning from metallic to non-metallic minerals other than coal, we find India in very much the same condition as it was eight years ago. We still lack the important raw materials for the manufacture of the most useful of all inorganic chemicals, sulphuric acid, such acid as is made in India being produced from imported materials; in the absence of deposits of native sulphur in India, there is small prospect of the development of an indigenous industry on a large scale until the smelting of sulphide ores becomes an established fact. A cheap supply of acid available for use at the coalfields would be a strong incentive to the utilization of those valuable materials which are now being wasted in most of the coke ovens and to the recovery in the form of sulphate of ammonia and tar. It is many years since the East Indian Railway Company set up their recovery plant at Giridih, and it is rather remarkable that their example has not been more widely followed. This is no doubt partly due to the absence of a cheap supply of acid and to the conservative nature of the Indian cultivator, whose unwillingness to adopt any methods not sanctioned by the immemorial usage of his country militates seriously against the introduction of artificial manures, but the demand for fertilisers is undoubtedly growing, although the imports in the year 1912-13, which were the largest up to that time, amounted to the insignificant total of less than 6 000 tons. It must be admitted therefore that the prospects of disposing of large quantities of sulphate are not as yet very encouraging.

SALTS OF POTSH.

Among the inorganic products the supply of which has been seriously affected by the present war, the most important are the salts of potash. Practically the whole supply of the world has been derived hitherto from the German salt-mines, and the danger of a possible potash famine has led to the development of numerous sources hitherto insignificant, but which have proved more elastic than might have been expected. At the same time the rise in price of the various salts has been so considerable—about 200 per cent- that serious consideration is being given to the possibility of developing the deposits known to occur in association with the rock sal, in the mines at Khewra, Nurpur and other places in the Salt Range. The question of the economic development of these deposits will also be seriously affected by the long and expensive railway journey from the Salt Range to the nearest distributing centres, although it is possible that the prevailing prices might be sufficiently high to permit of a profitable export trade being carried on during the period of the war. The establishment of a permanent industry on a sound economic basis must depend on the results of more extensive operations than have hitherto been carried out but the matter has been receiving consideration for some years past and it is hoped that more detailed information as to the nature and extent of the deposits may be obtained before long.

Photographical Postal Card.

The following method of preparing paper for photographical purposes is so simple that it may be applied to postal cards. Any well "sized" paper is available for the purpose, however, and even an unsized paper may be employed, provided it be treated with a 10% solution of gelatine in water carrying 2% of arrowroot—i. e., made soluble by boiling. A 50% decoction of carragheen is also available for the purpose. This, which is really a sizing, may be applied to the surface of the paper with a broad flat pencil. A surface thus prepared is far better, and the pictures thereon are stronger than when an unsized paper is employed. Having prepared your paper, go over the surface (after letting it dry thoroughly) using a smaller pencil, with a solution of 10 parts of iron oxalate in 100 parts of distilled water, and let dry. With a clean pencil, kept especially for the purpose, again go over the surface with a one per cent. solution of silver nitrate in distilled water, and let dry. Red light must be used in these two operations. The paper is now ready for use, and under proper precautions, chief of which is the absolute exclusion of light, will keep for several days.

In printing, make a strong copy from a glass negative, and develop in the following bath .—

Potassium oxalate, neutral	80 parts.
Distilled water	400 „

Mix. After development, wash thoroughly, and fix in the following bath : —.

Sodium Thiosulphite	5 parts
1% Gold chloride solution	5 „
Distilled water	100 „

Mix. This is the bath recommedded, but other baths may be used.

Small Trades & Recipes.

ORANGE BISCUITS.

Boil oranges whole in two or three waters till nearly all the bitterness is gone ; cut them, and take out the pulp and juice ; then beat the outside very fine in a mortar, and put to it an equal weight of double refined sugar beaten and sifted. When well mixed into a paste spread it thin on porcelain dishes, and set them in the sun, or before the fire ; when half dry cut it into what form you like, turn the other side up, and dry that ; keep them in a box, with layers of paper. They are much esteemed for deserts and are very useful as a stomachic, on journeys, etc.

ESSENCE OF VINEGAR.

During a hard frost expose vinegar to the weather in shallow vessels ; the watery parts will freeze, but the spirit will remain fluid. Repeatedly expose the fluid as it is obtained, and, if it be a very cold season, a pint of strong vinegar will be reduced by the frequent exposure to about a tablespoonful of a fine flavoured essence, and very pungent. This is a most excellent sauce for fish, but particularly for lobsters and oysters.

A GOOD INSECTICIDE.

To 20 lbs. of flour from ¼ to ½ lb. of London purple (a dye) is added, and mixed well. This powder is applied with a sifter or blower, or after mixing the same amount with 40 gallons of water, it may be used as a spray. This insecticide has been used in India with considerable success against several pests, notably the mango cicadid, and the larvæ of Papilio erithonius, which are so destructive to Bel, lime, lemons, oranges, pomelo, ber, etc.

REMEDY FOR WASP & BEE STINGS.

Carbolic acid in crystals, 1 dram; glycerine, 4 drams; distilled water, 1 dram. Dissolve the acid by the aid of a little heat. Two or 3 drops of the solution should be placed on a little cotton wool, which, if possible, should be tied over the wound, so keeping the air away

AN ALLOY FOR WHITE BUTTONS.

Copper, 57.9 parts; zinc, 36.8 parts; Tin, 5.3 parts. First melt the tin in a crucible and throw in the zinc. When both are melted, throw in the copper. When all are well mixed, pour into oiled moulds.

EXTRACT OF TEA.

Extract the crushed tea leaves with water and then distil the liquid in a vacuum. The first portion of the distillate, which contains the essential oil and other volatile flavours, is extracted with ether, and the oils are afterwards mixed with the extract which remains in the still. Both the delicate and the heavier flavours are preserved in the extract in this way.

FOAM FOR SYRUPS.

To each gallon of syrup of any kind add from 2 to 4 ounces of gum arabic dissolved in its own weight of water.

TO CEMENT VULCANITE.

Dissolve 1 part of sulphur and 3 parts of pure rubber in 6 parts of alcohol and 100 parts of bisulphide of carbon, and evaporate to the consistency of a thin paste. Join the fractured edges with this, and heat the whole to about 310°F. for four hours.

HARNESS VARNISH.

Isinglass, 1 oz.; indigo, 1 oz.; logwood, 1 lb.; best glue, 1 lb.; soft soap, 8 oz.; vinegar, 2 quarts; mix by heat and strain.

RAZOR STROP PAPER.

Mix the finest emery and finely powdered glass with paper pulp, and make into sheets in the ordinary way. Glue to a strip of wood.

Scientific & Industrial Topics.

Stray Notes on Butter

Fresh butter of good quality should present a rich straw yellow colour. It should possess a faint sweet odour, and a bland, soft, delicate flavour, melting in the mouth without any indication of grittiness. Pure butter is a complex chemical compound, consisting in large part of fats or glycerides of the nonvolatile acids, palmitic acid and butyroleic acid, with occasionally stearic acid. With these there occur small proportions of glycerides of the volatile acids, butyric, capronic, caprylic, and capriric acid. A mixture much used for curing butter is thus prepared:—one part each of sugar and nitre are mixed up with two parts of common salt and reduced to a very fine powder. This mixture is thoroughly kneaded into the butter in the proportion of about one ounce to every pound. After standing over for a fortnight butter so prepared will be ready for use and have a soft, agreeable taste, which it will retain a long time. In the preservation of all butter, the exclusion of air is of the utmost consequence. It is, therefore, packed for sale in oaken kegs or glazed earthenware jars, filled quite full, and covered with clean linen cloth on which salt is sprin-

kled. When in use the kegs should also be closely covered over, and the surface of the butter kept under brine. Lard, beef and mutton dripping, and tallow, with certain vegetable fats, are the chief adulterants, such adulterations may be suspected by their characteristic smell, and detected by their different melting points, by microscopical examination, and by their ethereal solutions. Messrs Angell and Hehner have proposed a convenient method of estimating the fusing points of fat by placing a given weight of definite size on the fat and observing the temperature at which it sinks into the substance. They find that the sinking point of genuine butter is remarkably constant, and that it is affected in proportion to the amount and sinking point of any adulterant fats used.

Rice Paper.

The substance which has received this name in Europe, through the mistaken notion that it is made from rice, consists of the pith of a small tree, aralia papyrifera, cut into thin slices. The tree grews in the wampy forests of Formosa and apparently nowhere else and large quantities of the stems are conveyed to Chinchew, where the snow white delicate pith is carefully sliced by spiral cuts into uniform sheets of a fine ivory like texture. It is dyed various colours, and extensively used for the preparation of artificial flowers, while the white sheets are employed by native artists for water colour drawings.

The Mexican Poppy.

It is known as Argemone mexicana or Prickly poppy. Its Bengali equivalent is *sial-kanta.* It grows all over India—in many places in almost embarrassing profusion—and yields abundant crop of seeds which is very oleagnious, and which, considering the demand of oil seeds at the present time, might be developed as an article of commerce to a much greater extent than is at present the case. The seed oil has in the past been used medicinally and for burning purposes, but its acrid taste and active therapeutic action precludes its use for edible and culinary purposes. It is thus restricted for general employment, but there are other directions in which it might be extensively used, such, for instance, as for paints, caulking timber and boats, and for making soap. The oil seed is not that would be attractive to European Commerce, but there is no reason why it shonld not be used widely in this country, and the plant grows so abundantly that there would never be any fear of the supply failing to meet the demand. Now is the time for collecting and pressing the seeds for oil.

The Indian Walnut.

Its scientific name is Aleurites moluccana. It is also known as the Belgium Walnut or the candlenut. Its Bengali and Hindusthani equivalent is *jangli-akrot.* The root of the tree affords a brown dye, which is used by the Sandwich islanders for dyeing their cloths. It is cultivated for the sake of its fruit, which is generally two inches in diameter. The kernels taste very much like fresh walnuts, and are reckoned wholesome. However, it is for its oil that the fruit is so much valued. The nuts contain 50 per cent of oil, which is extracted and used as food and for burning. It is known as *kekuna* in south India and Ceylon. The nuts when strung upon a thin strip of bamboo and ligh-

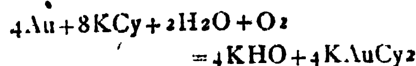
ted are said to burn like a candle. Strung upou strips of the wood from the palm leaf they are regularly used by the inhabitants of the Sandwich Islands, where the plant is called *kukni*, and the torches are reported to burn for hours, giving a clear and steady light. The yearly production of the kukni oil in the Sandwich Islands is said to be 10,000 gallons. It is now exported to Europe for candle-making, and is reported to be equal to Til or rape oil. Simmonds reports that 31½ gallons of the nut yield 10 gallons of oil, which bears a good price in the home market. It may be obtained either by boiling the bruised seeds or by expression. The oil is very fluid, of an amber colour, without smell, congealing at 32°F., insoluble in alcohol, readily saponifiable, and very strongly drying, hence it can be used for soap making and for paints. The cake, after expression of the oil, is a good food for cattle, and useful as manure. Surely this tree ought to attract the attention of our capitalists, industrialists and scientists.

Formulas, Processes & Answers.

How to Extract Gold.

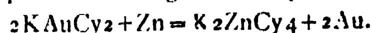
V. R. C., Khargpur, writes :—Will you kindly inform how gold is extracted?

There are two processes of extracting gold, the chlorination and the cyanide. The cyanide process has some advantage over the other. The process is briefly this:—The crushed ore is treated with a dilute solution of potassium cyanide (containing from 0.25 to 1 per cent of potassium cyanide), with free exposure to the atmosphere. The gold is dissolved in the form of a double cyanide, according to the equation—



$$4Au + 8KCy + 2H_2O + O_2 = 4KHO + 4KAuCy_2$$

From this solution the gold is pptd. either by means of metallic zinc (usually in the form of fine turnings) or by electrolytic deposition. The pptn. by means of zinc takes place according to the equation—



$$2KAuCy_2 + Zn = K_2ZnCy_4 + 2Au.$$

The deposit after being freed as far as possible from zinc, is melted down with a suitable flux, and yields an alloy containing 70 to 80 per cent of gold. When the gold is pptd. electrolytically, the anodes employed are of lead foil. These are finally melted down and cupelled, yielding gold of a high degree of purity.

How to prepare Sulphocyanide of Mercury.

K. M. P., Bombay, writes :—Will you kindly say how sulphocyanide of mercury is prepared?

Fuse in a crucible equal parts by weight of yellow prussiate of potash and sulphur; it is frequently advisable if the heat cannot be well regulated, to include a little carbonate of potash. Lixivate the mass with water, and filter; the filtrate will be sulphocyanide of potassium, which, upon being added to a solution of mercury, dissolved in nitric acid, gives a copious precipitate of sulpho-cyanide of mercury.

Cement for Glass.

J. S. P., Larkana, writes :—Will you kindly give a formula of a cement for glass?

Best gelatine, 100 parts, dissolved by warming in 150 parts (of 96 % acetic acid, then add 5 parts) of ammonium bichromate in fine powder, keep away from light. When drying mended parts, expose directly to the sun.

How to Cut Glass.

S M. H., Chachrauli, writes : – Will you kindly state how to cut a glass ¼ in. thick ?

Gum arabic, 10 drs.; water, 3 ozs.; powdered tragacanth, 4 drs.; hot water, 8 ozs.; storax, 2 drs.; benzoin, 2 drs.; 91° alcohol, 9 drs; powdered charcoal, 3 to 3½ ozs. Dissolve the gum arabic in the cold water and mix it with the paste made from the tragacanth and hot water. To the mucilage add the rosins, dissolved in the alcohol, and enough finely powdered charcoal to form a mass to be rolled into cylinders of suitable length and about 4/10 of an inch in diameter. When rolling the sticks, powdered charcoal is employed to prevent adhesion. When thoroughly dry, the pencils are ready for use and are managed as follows : one end is sharpened like a lead pencil, and ignited ; then, the glass having been scratched with a diamond the heated and glowing point of the pencil is carried close to the glass in the direction in which it is intended to cut or split it.

Imitation Ivory.

J. S. P., Larkana, writes :—Will you kindly give the formula of artificial ivory which appeared once ?

The formula was as follows :—Powder very finely some egg shell; make isinglass and brandy into a paste with the egg shell. Colour it as desired. The mould must be oiled, and the paste poured in warm. When dry it is ready for use.

To preserve Green Ginger.

B. N., Chittawadgi, writes :—Will you kindly give a process for preserving green ginger which appeared once ?

Put the green ginger regularly, every night and morning for a fortnight, into fresh boiling water. Remove the outside skin with a sharp knife boil it in water until it is quite soft, and slice it in thin slices. Make ready a syrup of 1 lb of loaf sugar in half a pint of water, clarify it, and put the ginger into it. Boil until it is clear, keep for 14 days and bottle.

Pomade.

C M. & Co, Bhavnagar, writes :—Will you kindly give a formula for a good pomade ?

White wax, 2 ozs.; oil almond, 16 ozs.; oil neroli, 20 drops ; oil cloves, 3 drops ; otto de Rose, 5 drops. Melt the wax in the oil by the aid of heat and then add the scents.

How to make Linseed Oil.

N. M. C. & Bros , Bellary, writes :—Will you kindly give the process of making linseed oil ?

We make no apology for quoting the following valuable passages from Mr. L. P. Barmah's admirable report. He describes 3 methods of (and the machinery used in) expression of the oil :—

"(a) Kolhu.—This consists principally of a thick block of wood with a cavity in the centre, which receives the seeds, and a moveable rod which, with a few minor arrangements, is made a revolve in the cavity of the former piece and thus presses against the seed ; the oil which is thus expressed runs out through a spout. The cost of a medium sized press of this description is about Rs. 6, and the bullock required to work it can be had for Rs. 10 or 12. It presses 7 seers linseed a day, working eight hours, or nearly 5 maunds a month. It is attended to by women, on whom it devolves

as one of their household duties; but if worked by hired labour, a man on 2 annas per diem would be required for every 3 presses, which amounts to Re. 1-4 per month per press; the man would look after the bullocks too. Taking all the year round, the cost of feeding (fodder and cake) a press bullock amounts to Re. 0-1-3 per day, or Rs. 2-5-6 per month. The wear and tear of the press amounts to 5 annas per month. To these we may add interest at 6 per cent on the capital invested in the manufacture of the kolhu and purchase of bullocks, amounting to a monthly expense of Re. 0-1-4 nearly. Thus the total cost of working a kolhu per month, during which it will press 5 maunds seed, is Rs. 3-15-10. Therefore, the cost of pressing 100 maunds seed by a native press amounts to Rs. 79-12-8.

"(b) English Hand Press.—This was once used by a firm in Cawnpore, but finding it difficult to dispose of the cake and oil, the attempt was abandoned. The press consisted of two strong screws and a number of iron plates. The seed was ground by an English grinding mill, placed in a piece of gunny cloth and then put in between each pair of plates; when all the plates were thus occupied, a fire was created by burning coal on the two sides and the screws tightened. The pressure assisted by heat expressed the oil, which ran down a channel into a reservoir where it collected. About 1¼ maund of linseed was pressed at a time, each pressing taking an hour and a half and done by four coolies, who received Re. 0-2-6 for every pressing; two of them worked the press and the other two covered the seed in gunny cloth and took rest. About 10 maunds of seed was thus pressed per day of 12 hours by one of these presses. The cost of pressing 10 mounds of seed by each press may therefore be taken at Rs. 4-9. From the reservoir the oil was carried to the boiling pan, where water was added to it in the proportion of 1 to 40, boiled for about an hour and a half and then removed to a strainer. When the oil sufficiently cooled down it was put in canisters. About 31 maunds of oil could thus be boiled in a day.

"(c) English Steam Press.—About 100 maunds of seed could be pressed a day at a cost of Rs. 18-4-5, but wood, instead of coal, was employed, the cost of manufacture being unnecessarily high." [Mr. Barmah's report is dated 1891, so the figures must be increased a little accordingly.—Ed. I]

A remedy for Diarhœa.

Mr. Sri Narain Sharma, of Tonk Unani Pharmacy, has sent the following for general information :—"Mastagi, Shingrafrumi, borax, and opium; take all the 4 ingredients in equal parts and after powdering them mix with sufficient quantity of lemon juice. Prepare pills from the mass a little smaller than a grain and get the pills covered by silver leaves. The medicine is ready for use. Dose: For children 1 to 4 years old ½ pill twice a day with mother's milk. For 4 to 10 years old 1 pill twice daily with water and those above 10 to any age 3 pills three times daily with syrup of Habbullos, or in the absence of it with fresh water."

Carbon Plates and Rods.

In reply to the queries of D. V. M., Chindwara, and G. G. K., Bombay, Messrs Kitchel & Sons, Tonk, have kindly sent us the following answers.

(1) The simple and cheapest way is to cut the plates or rods of required size from the hard carbon deposited in the inside of the gas retorts—generally known as gas carbon or retortscrurf, and old saw fed with silver, sand and water will enable the operator to cut out the larger pieces from the curved cake that comes out of the retort. (2) Powdered gas carbon, 85 parts; gum lac resin, 15 parts. Make a stiff paste by the aid of water. Force into steel moulds at a temperature of 212°F, under a pressure of 300 atmospheres, say, 4500 lbs. per sq inch. (3) If the plates or blocks are required for Lechlanche type cells, use powdered carbon, 55 parts; manganese peroxide, 40 parts; gum lac, 5 parts.

[The readers are informed that Messrs Kitchel & Sons, Post Office Road Tonk, can give any information about batteries and accumulators.- Ed. I.]

Industry Buyers' & Sellers' Guide.

Michael D. Chellia, South Pudupet St., alamcottah, S. India.—The best harmoniums are those of Dwarkin & Co., Harold & Co., T. E. Bevan & Co., and Mohin Bros. Calcutta. Wants to buy silk, velvet and gold laces, used stamps of Native States, felspar galvanised iron sheets and wires and pill making machine. Rs 200 will be sufficient.

S. Manikkam Chetti, Velur, Dt. Trichinopoly.—Wants buyers of betel leaves, ground nut oil, Indian senna and solanum jacquini. Write to Andrew Yule & Co., Calcutta, for ærated water machinery and requisites.

D. V. Manjrekar, Chhindwara, C. P.—He can supply watch and clock maker's tools and accessories.

Tirhut Button Factory, Mehsi, Dt. Champaran. - Wants to buy mother of pearls and oyster shells.

K. Ganesh Lall, Udaipur, Mewar.—Wants te buy bharakas.

N. Ramasubramonier, Gopalasamudrum, Dt. Tinnevelly. —Wants to buy silk yarns.

A. Arangaden, Cannanore. Wants to buy ribs for jersev banians and its machine.

Parbhoo Lall Bros, Sudder Bazar, Ambala.—Wants buyers of blue black ink and powder.

Roll No. 3558, Itwara Bazar, Nagpur. - Wants to buy Japanese matches.

Sharman & Sons, Gokalpura, Agra.—Wants to buy Japanese machine for making mother of pearl buttons. Wants buyers of brushes. Sample set of 50 varieties can be had for Rs. 15 by registered V. P. P., excluding railway freight. Rs. 2 to be sent in advance

J. L. Pandey, Residency Office, Jaipur.—Wants buyers of mahua oil and honey. Wants to buy cured and mounted skins of Hiran, Chital, Panther and Tiger.

Megh Raj, Pleader, Batala, Dt. Gurudaspur, Punjab.—Wants to buy oil pressing machinery, and directories of France, England, Canada & U. S. A.

C. K. G. Iyer, Kumakulam.—Wants buyers of khuskhus roots. Wants to buy patchouli seedlings.

J. C. Panjabi, Bombay Bazar, Karachi.—Wants to buy metal punches of various sizes.

K. M. Parmdeva & Bros., Multan City.—Wants to buy lamps with burners and chimneys.

The Bharat Sebak Agency, Saharanpur.—They can supply aluminium wares, walking sticks, toys and sunflower and other seeds.

Krishna Das, Chunar.—The books can be had from the author, whose address is Beadon Street, Calcutta. Stanley Gibbon's Catalogue of postage stamps will suit all your requirements. Wants buyers of used postage stamps.

K. N. Chowdry, Grant Road, Bombay — Can supply new and second hand books of all sorts at cheaper rates.

A. John, Sons & Co, No. 100, 1st Division, Mardana, Colombo.—Wants to buy Burmese saronges or lungies; cotton, silk and woolen hosieries; pith, straw and felt hats; Brown Grey or black Holland; Cotton and woollen Jersey underwear, shirts and collars of cotton twills. Manufacturers and big merchants only are requested to communicate.

E. K. L. & Sons, Eklasapuram, Vaniyambadi, N. Arcot.—Wants to buy grey and mule yarns from No. 6 to 60 single and twisted: wool of all counts and colours; dyes; waste silk; and Japanese silk in all colours.

S. M. Diengdoh, Cherrapoonjee, Khasi Hills, Assam.—Wants buyers of pure orange honey, beeswax, long pepper, and raw arrowroot at cheap rates.

D. V. Manjrekar, Baradipura Chhindwara, C. P.—Wants to dispose off the following journals of 1914 at the following rates:—(1) Oct. issue of the Horological journal, 4 as. (2) Oct. issue of the Talking machine news and sidelines, 4as. (3) Oct. issue of Toy and Fancy goods Trader, 7 as. (4) Dec. issue of the Photographic Dealer, 3 as. (5) Aug. issue of Charlick's monthly circular for postage stamp collectors, 2 as.

S. A. Jubbar, Pyiumua.—Wants to buy platinum and the Kinora Stereoscope.

S. Shaukat Hussain Kazim, Southern Skirts, Jaypur, Rajputana.—Wants to buy machines for wick and Newar.

Roll No. 1727.—Hand rotary chain pump will suit your purpose.

R. P Sinha, Mogalpura St., Patna City.—Wants to buy lithographed tin boxes, raised wooden letters for sign boards, and a litho press.

N. V. Shahani, 92, Siro Ghat Lane, Hyderabad, Sind.—Wants to buy matches, glass tumblers, chimneys, bottles and gas mantles Wants agencies in Sind of all kinds of goods.

Hudson & Co., Chandbali.—Wants buyers of ghee, paddy and rice, Fish, Satabari, and bones at Re 1-14 per maund. Wants to buy a cinematograph on instalment system.

Niranjan Dass, Civil Bazar, Campelpur:—Want purchaser of wool and two volumes of "Kalpaka," Nos 6 & 7, at Rs. 3. Wants to buy second hand knitting machine. The Dubied Knitting Machine will suit your purpose.

The Laksmi Trading Co., Botad, Kathiawar:—They can supply needles for the Durbar Autoknitter at Re. 1-4 per dozen.

Harman Singh, Kateli Bangalow, Sitapur, Oudh:—Wants to know the addresses of firms which are doing business in Castor Cakes

Roll No. 3558, Nagpur:—Wants to buy the most funny automatic seller.

J. D. Rai, Puduug Block, Kalimpong:—Wants to buy War Photos at six pies to one anna each.

Boaudadi Narasappah, Chittawadgi. Dt. Bellary:—Wants purchasers of 30 or 40 sandal wood trees.

Venkatachalam & Son, 166, Doddapettah

Mysore :—Wants to purchase ice making and ice cream making machines.

S. Barden, Ferozepore :—For the chemical named write to D. Waldie & Co., Cawnpur.

Thakurdas Chopra, Gujranwala, Punjab :—Can supply, on moderate commission, iron safes, almirahs and Trunks, also Brass, Copper and Kansi vessels, etc.

G. D. Gupta, Kotah :—For the books named write to the publishers.

J. N. Ahuja & Co., Shikarpur, Sind :—Wants to buy spectacles and their cases.

Dumodardass Durgaprosad, 45, Cross St., Calcutta :—Wants purchasers of Gota Kinari.

F. D. Jagtiani, Near Khai Road, Hyderabad, Sind :—Wants to dispose of a new set of "How to master a mail order business" with 20 money making secrets by Hugh MacKean at cheap rate.

T. M. Rathnasabapathy Mudaliar, 3, Mulla Sahib Lane, George Town, Madras :—Wants to buy China clay, pipe clay and panama wood or quillia bark.

Jeorakhan Lal, Ajaigarh, Katni :—Wants to buy Japanese matches.

Desikarbar Co., Fatehpur City :—Wants to dispose of a Harrison Patent undervest sun ribber knitting machine at cheap rate. They are quite new and was purchased direct from Manchester.

Ram Chandra & Bros. Lahore :—Wants purchaser of waxes, turpentine, and a concert Edison Phonograph with 6 records and some Gramphone records.

Dr. G. B. Nayate, Kannod, via Harda. G. I. P. Ry :—Dietz Acetylene lantern will suit your purpose.

Premchand Javerchand, Alleppey, Malabar Coaat :—Can accept agencies for the Malabar Coast and can supply products of Malabar. Wants the services of an expert Calcutta coir broker.

Yashphaul Talwar, Abottabad :—Wants to dispose of a Durbar Autoknitter with 10 lbs. of Yarn. Cost price Rs. 185.

Daya Shankar Kumria, Phillowe, Dist., Jullundar, Punjab :—Wants to buy empty inkpots and phials and coloured tin boxes for boot polishes.

Bhut Nath Banerjee, Ink Factory, Alambazar, Baranagore :—Wants purchasers of inks and powders.

R. Narain & Sons, Yandlianwala, Punjab. —Wants to bye Japanese matches.

Ram Chandra, Bikanpur :—Wants to buy rubber stamp frames, magic picture rings, phials and cocoanut oil.

R. P. Sinha, 7, Golagall, Benares City :—Wants purchasers of milk-o-sugar and tea at Re. 1-4 per lb. tins.

Reference Catalogue of Books, etc.,

Journal on Sugar.

The Sugar User's Journal, monthly, Annual subscription is Re. 1-2.

Book on Butter making.

McKay and Larsen's Principles and Practice of Butter making, Dol. 1.50.

Books on Assaying.

(1) Furman's Manual of Practical Assaying, dol. 3.00. (2) Lodge's notes on Assaying and Metallurgical Laboratory Experiments, dol. 3.00. (3) Low's Technical Methods of ore Analysis, dol. 3.00. (4) Millery Manual of Assaying, dol. 1.00.

Book on Bio-chemistry.
Mandel's Handbook for Bio-chemical Laboratory, dol. 1.50.

Book on Piece-Dyeing.
Reisig's Guide to Piece Dyeing, dol. 25.00.

Book on Paints and Varnishes.
Sabin's Industrial and Artistic Technology of Paints and varnish, dol. 3.00.

Book on Dental Chemistry
Smith's Lecture notes on Chemistry for Dental Students, dol. 2.50.

Book on Electric Batteries.
Niaudet's Elementary Treatise on Elec. Batteries, dol. 2.50.

Book on Estimates.
Metcalfe's Cost of Manufactures and the Administration of Workshops, dol. 5.00.

Books on Mineralogy.
(1) Chester's Dictionary of the names of Minerals, dol. 3.50. (2) Dana's System of Mineralogy, dol. 12.50. (3) Ditto. First Appendix, dol. 1.00. (4) Eakle's Mineral Tables, dol. 1.25. (5) Egleston's Catalogue of Minerals and Synonyms, dol. 2.50. (6) Goesel's Minerals and Metals, dol. 3.00.

Book on Electric Instruments.
How to make and use Familiar Elec. Apparatus, by Don. Cameron Shafer net. 3s. 6d.

Book on Motion Picture.
Motion Picture making and Exhibiting, by John B. Rathbun, net 6s.

Book on the Year 1914.
The year 1914, (Ill.) net 2s. 6d.

Reference Directory.

Photo Cameras.
(1) Elliot & Sons, Park Road, Barnet, Herts. (2) Chas. Zimmermann & Co., 9, 10, St. Mary at Hill, London, E. C. (3) The Bayer Co., Ltd., 157, Leeds Road, Bradford. (4) T. H. Dallmeyer, Ltd., Denzil Works, 10 D, Neasden, London, N. W. (5) Ross Ltd., Clapham Common, London, S. W. (6) C. P. Goerz, 1 to 6, Holborn Circus, London. All of England.

Toys.
(1) Fred. Ellinghans, 2, Bulter St., London, E. C. (2) E. A. John, 24, Finsbury Sq. London, E. C. (3) Weintrand Sons & Co., 2, Cripplegate Bldgs., Wood St., London, E. C.

All Kinds of Machinery.
(1) The National Association of Manufacturers, New York, U. S. A. (2) Montgomery Ward & Co., Chicago, U. S. A.

Artificial Stone making Machinery.
Fielding & Platt, Glasgow, Scotland.

Bicycle Machinery.
(1) E. W. Bliss Co., Brooklyn, N. Y., U. S. A. (2) Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., U. S. A.

Box Printing Machinery.
Honchin and Huber, Brooklyn, N. Y., U. S. A.

Capsule making Machinery.
The Liverpool Press & Tool Co., Bridgewater St., Livorpool.

Carbon Paper Machinery.
John Waldron Co., New Brunswick, N. J., U. S. A.

Colours.

Wengers Ltd., Etruria, Stroke on-Trent, England.

Copying Machine.

The Auto Copyist Co., 64, Queen Victoria St, London, E. C.

Twine Machinery.

Watson Machine Co., Paterson, N. J., U. S. A.

Brief Queries & Replies.

K. D., Chunar.—Addresses of postage stamp dealers and information on journals have already appeared in Vol. IV. Our chemist gave you information about ochres for a small fee.

Roll No. 1727.—No, there is no easy method of ascertaining nitrogen, phosphoric acid and potash in soil without chemical analysis.

K. R. K., Multan City.—Consult the reference directory of Japan which has already appeared in Nov. 1914 issue.

H. N. J., Bettiah.—Addresses of fruit dealers have already appered in May 1914 issue.

V. & S., Mysore.—There is no separate book on ice cream making machine. An article appeared in Vol. IV. The writer of the article can give you more information and formulas for a small fee.

N. V. S., Hyderabad.—The machine has not yet been put on the market. The address of the Harrods Ltd., has appeared in Oct. 1914 issue.

N. M. C. & Bros., Bellary.—An article on peppermint has appeared in Vol. IV.

Md. Y., Nasirabad.—Write to the Editor of the Medical Gazette, Calcutta, for your requirements.

W. E. Sanger, Secunderabad.—The company has ceased to exist.

N. N. Roy, Jaipur.—Yes, you can send the articles. The paper is published by the Indian Association for the cultivation of Science, Bowbazar St., Calcutta.

M. H. P. Ghatalah, Banganapalle.—Offers a medicine free for 200 patients who are suffering from chronic colic.

S. L. D. & Brother, Sirsi.—Wants a formula for making an ointment like Amritanjun and Oriental Pain Balm.

H. D, Paikpara Road.—We regret we cannot undertake to reply to so many of your queries. Henceforth please quote your roll number when writing for reply. If you require replies to all your queries you must have to pay our expert's fees.

M. D. C., Palamcottah.—Thanks for your informations. What do you mean by "reducing gold"? T. C. C/o INDUSTRY can give you a formula for making cholera pills for Rs. 2 only. Til, cocoanut, castor, poppyseed, bennut, olive, almond, peach kernel and palmkernuel oil may be used as bases for hair oils. Any scent or combination of scents may do. The same gentleman can give you processes and formulas for hair oils for Rs. 5 only. What do you mean by "complexion wafers"? Pachakarpuram is only refined camphor. See an article on camphor in Vol. IV.

G. D., Quetta.—See a reply to N. V. S., Hyderabad, above.

R. N. & Sons. Tindlianvala.—Wants to know how to mend leaks in empty kerosene oil tins. Why not solder the leaks? See a reply to K. R. K., Mooltan city, above.

R. C., Bikanir.—Any printer will undertake to print your English and Hindi books.

R C. D., Baraipara—The book to suit you is the Electroplating and Electro-refining of metals. By Watt & Philip Rs 10-15, and can be had from D. B. Taraporevala Sons & Co., of Bombay.

R. P. S, Benares City.—"Tabloid" soluble tea will suit your purpose. Any big chemist can supply the same. By Swiss process we mean a process invented in Switzerland.

K. V. G. R., Sagour—The sample of leaf which you sent is sial kanta, notice of which will be found in the section of Scientific and Industrial Topics.

N. R. V., Batala.—The machine has not yet been put on the market.

K. M. P., Bombay.—The measure is French measure. I C. C. is approximately equal to 17 minims. Information on making logwood extract appeared in Vol. II.

L. B. & Co., Shikarpur.—Write to the enquiry offices of Japan, addresses of which have appeared in Nov. 1914 issue.

J. C. B. & Co., Lyallpur. —The institutions to suit your purpose are Ghosh, Mitter & Co., and Atkinson & Co., both of Bowbazar Street, Calcutta.

K. C., Shiralakoppa.—The articles on ink manufacture have appeared in Vol II.

N. G. B. M., George Town, Madras.—Our chemist can give you information about pharmaceutical tinctures, etc., for a small fee.

C. S. N. R., Channarayapatna.—Any aniline pigment will do. Write to V. K. Ranade, Girgaon, Bombay.

H. S. & Co, Simla.—Johnsen & Jorgensen, Ltd., 26 and 27, Farringdon Street, London, E. C., will undertake to manufacture glass bottles and phials of any shape and design.

M. H. P. G., Supdt of Industries, Banganapalle State.—He is ready to pay a reward of Rs. 100 to any gentleman who can give him a guaranteed specific for Guinea worm.

N. V. R & Bros., Madura.—See a reply to H. S & Co., above.

H. C. L, Sultanpore.—The formulas for fountain pen inks are trade secrets. A gentleman can give them to you for a couple of rupees only.

R. C. T, Bahraich.—(1) Can you send us the sample of china clay coloured buttons of which you speak of? (2) Yes, the agency has closed now (3) Wants the services of Bengali Brahmin youth who can start and work a saltpetre factory there. He can be a shareholder also. All initial capital shall be supplied.

R. P. S., Patna.—Communicate with any high class printers. An article on snuff has already appeared. Your suggestion is not suitable at present. Various recipes have already appeared.

A. F. A. & Co., Sialkot. Can you send us the formula for finding out its defect, i. e. why the boot polish does not impart brightness?

S. H. K., Jaipur city.—It was oversight on the part of the printer. The wire sieves have 16 to 90 wires to the inch and are made in six sizes.

N., Pondicherry. —The books to suit your purpose are (1) Cow keeping in India, by Isa Tweed, Rs 4-12; and (2) India in 1887 as seen by Prof. Robert Wallace, Rs. 12. Write to D. B. Taraporevalla Sons & Co., Bombay.

R. A. K., Bombay. —Why don t you consult any books on biscuit making, whose names and prices have already appeared?

T. K, Hyderabad. Kindly communicate with our consulting chemist Mr. S. Sen, M. A., for your requirements.

B. L., Mehsi.—The gentleman has changed his address and we do not know his present whereabouts.

Needy C/o INDUSTRY.—Wants to know what is Alexandrian tutty. It is a kind of mineral or chemical, but what is its equivalent and where to obtain it? The information can be had in old books on chemistry and alchemy as also in dictionaries of arts and sciences. [We think it is oxide of Zinc. —Ed.]

Calcutta Market

Calcutta, Mar. 15.

EXCHANGE.

Bank T T	1-3 31-32
Bank D D	1-4
3 Months' D A	1-4¼
4 " "	1-4 5-16

BULLION MARKET.

GOLD— Rs.

English Bar—100 (touch) per tola ...24-10-0
National Bank ... 24-11-0
Australian Bar—(100 touch) ... 24-7-0
Sovereign—Victoria Shield, per piece 15-10-0

SILVER—

English Silver Bar of 17 ½ dwt better per 100 tollahs ... 71-10

Interest and Discount.

Bank of England from 8th Aug 1914	5	%
Bank of Bombay from 20th Aug 1914	6	"
Bank of Bengal from 5th Nov. 1914	6	"
Bank of Madras from 12th Oct 1914	6	"

PRODUCE MARKET.— Mar 15.

RICE.

Dwadkhani Rice	Rs 6 4 to 6-8 per md.
Banktulshi	Rs 5-4 to 5-7
Burma Rice	Rs 3-8 to 3-11
Ballam	Rs 5-10 to 6-2
Kazla	Rs 3-14 to 4-2

DAL

Moog Dal at Rs 7-8 (For Black kinds)
Yellow at Rs 13
Musur Dal at Rs 7 to 6 per md
Arhar Dal at Rs 5-12 to 610 per md

SUGAR DESI

Cane.—Benares Rs 14-0 to 14-8 nominal.
Goor: Rs 4-8 to 5
Date—Raw Dobara 12-8 to 14-8
Goor no stock.

SUGAR IMPORTED.

Cossipur first white Rs 12 8
Small grain at Rs 12-0 per md
Grey No. 1 at Rs 11-0
Java White at Rs 11-12 per md

Printed & Published by K. M. Banerjee at the "Industry" Press, Shambazar, Calcutta.

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Industry

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Vol. VI, No. 61 April 1915.

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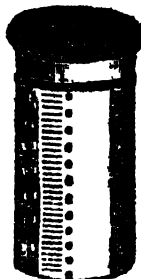
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Shaving Brush As 8.

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Industry

A Monthly Journal of Handicrafts & Commerce.

Vol. V. Nos. 49-60.

"We all recognise that without a scientific foundation no permanent superstructure can be raised. Does not experience warn us that the rule of thumb is dead and that the rule of science has taken its place; that to-day we cannot be satisfied with the crude methods which were sufficient for our fore-fathers, and that those great industries which do not keep abreast of the advance of science must surely and rapidly decline?"

——H. I. M. King George, V.

From April 1914 to March 1915.

K. M. Banerjee & Brothers,

Printers, Publisers and Booksellers,

3, Mohun La Mitter's Lane, Shambazar,

CALCUTTA.

What Our Readers Say.

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[Space forbids us to give a range of unsolicited opinions of which we receive an overwhelming number from our readers daily. We give below the extracts from only a few of them, which we received during four months only, showing what *Industry* is and how it has been received and appreciated. The readers will see that the writers include among them highest authorities, *i. e.* in fact men who are able to judge and form an opinion. We have their letters to prove our assertion.—Ed. I.]

No. 426. 16-10-14. C. P. Bajpai, Espr., Ry. Lines, Gorakhpur, wrote : "Your Industry has a good future and I sincerely wish it every success."

No. 445. 25-10-14 Mr. J. C. L. Airy, B. A, Head master, Jagraon, Punjab, wrote :—"For some time I am at Turu. Here I showed your Industry to a few gentlemen, all very respectable and most of them High Government officials. All tongues speak highly of your journal. It is here called a practical master of science and art. I am sorry people do not make use of such thing. * * * May God give you His unbounded help."

No. 528. 23-1 -14. J. H. D, Panasa, wrote .—"I thank you very much for all of your advices you offer through your precious paper."

No. 530. 23-11-14. Messers Ram Chandra & Bros., Govt. Contractors, Lahore. wrote :—"We cannot sufficiently thank you for your endeavours to help the indigenous industries, in a way which does credit to you."

No 547. 4-12-14. Jadavjee Doolabhdas, Ghatkopar, Bombay. wrote :—"I am much pleased by reading many useful and interesting subjects in your Industry. You are awakening the energies of the young generation of India, Many congratulations to you for writing such good subjects."

No. 554. 8-12 14. S A Noorani, Veraval, Kathiwar, wrote :—"Ever praying for the long life and prosperity of your valuable paper and patriotic venture."

No 575. 24-12 14. S Shankat Husain Kazim B A, Municipal Commissioner, Jaypur, Rajputana, wrote :—"My second son is a student of the Mechanical Engineering class, Technical Institute, Baroda There he came across your Industry paper and sent them to me as he knew I valued such things. The paper is really worth tons of jewels It bespeaks of the untiring efforts you are making to regenerate the Indian Industries. No one can thank or reward you adequately for the noble and magnificent task you have taken upon yourself to perform God shall reward you for your noble sympathy towards your countrymen"

No. 587. 2 1 15. N Murari Chetty & Bros., Merchants & Agents, Bellary, wrote :—"We find the contents as usual very satisfactory."

No. 658. 26 1-15. M. Shafi, Supervisor, P. W. D, Muscat, Arabia, wrote :—"I congratulate you on your good [illegible] and wish you success in the most difficult task, you have taken upon yourself."

Readers ! Do you want more for your conviction about the usefulness of Industry ?

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Industry People's Ed.

Monthly Journal of Handicrafts & Commerce.

VOL VI. CALCUTTA, APRIL, 1915. NO 61.

Secret of Success

YOU have heard of astonishing success in life—reaching the highest ladder of material success with an infinitesimal beginning. But have you enquired how success is achieved? Surely it is not absolutely the fate that decreed it —if decree of fate can it be called. It is not exactly happy circumstances that augur success. For happy circumstances have ruined more men in the world than adverse ones, and history records the tales more graphically than imagination can describe. Even genius is not the right key to unlock the gate of success for genius inoperative is no more genius than a bushel of acorns in a forest of oaks.

Life of Edison,the great American inventor, gives much food for serious reflexion to those who really desire to succeed in life. You need not be a genius to achieve success but you have to utilise whatever intelligence that is given you. "I've known Edison since he was a boy of fourteen" said a friend; "and of my own knowledge I can say he never spent an idle day in his life. Often, when he should have been asleep, I have known him to sit up half the night reading. He did not take to novels or wild western literature, but read works on mechanics, chemistry, and electricity; and he mastered them too. But in addition to his reading, which. he could only indulge in at odd hours, he carefully cultivated his wonderful powers of observation till at length, when he was not actually asleep, it may be said he was learning all the time,"

"After I have completed an invention," says Edison, "I seem to lose interest in it. One might think that the money value of an invention constitutes its reward to the man who loves his work. But speaking for myself, I can honestly say this is not so. Life was never more full of joy to me, than when, a poor boy, I began to think out improvements in telegraphy. and to experiment with the cheapest and crudest appliances. But now that I have all the appliances I need, and am my own master I continue to find my greatest pleasure, and so my reward, in the work that precedes what the world call success."

Edison's life shines as a beacon fire to the youngman with ambition, and any one can aspire to live like him—working with untiring drudgery. "The secret of success" it is said "lies in that old word Drudgery, in doing one thing long after it ceases to be amusing."

It is this one thing that one can do which gathers one together from the chaos and concentrates one from possibilities to power and turns powers into achievements. It is the daily task, whatever it be, that mainly educate the man. All culture is superficial compared with what that gives.

When Roman Emperors were taken from the plough, the empire was mistress of the world. But in later Rome both the tillers of the soils and workers on the machines were held in disregard bordering to contempt so much so that even enlightened Cicero wrote : "All artisans are engaged in a degrading profession. There can be nothing ingenous in a workshop." Aristotle said : "The best regulated states will not permit a mechanic to be a citizen ; for it is impossible for one who lives the life of a mechanic, or hired servants to practice a life of virtue." But the consequence became serious ; this contempt for labour robbed the nation of its real strength, and it perished from earth.

The sincere untiring work scarcely fails to achieve success. Extraordinary merit—genius—may help in the achievement but it cannot be the essential requirement to attain success. We may not have wings, we may not soar. But we have feet, and by slow degrees, by more and more we can scale and climb the cloudy summit of our times. "Drudgery" has been called "the gray angel of success" and it is truth that has been said. Mr. Gladstone when nearing four score and ten years, said, "I have found my greatest happiness in labour. I early formed the habit of industry, and it has been its own reward. The young are apt to think that rest means cessation from all efforts but I have found the most perfect rest in changing effort. If brain-weary over books and study go out into the blessed sunlight and the pure air, and give heartfelt exercise to the body. The brain will soon become calm and rested. The efforts of nature are ceaseless. Even in our sleep the heart throbs on. If these great forces ceased for an instant death would follow. I try to live close to nature, and to imitiate her in my labours. The compensation is sound sleep, a wholesome digestion, and powers that are kept at their best ; and this, I take it is the chief reward of industry." The life of J. N. Tata teaches us how to succeed with insignificant beginning even among adverse circumstances and his statue in Bombay was raised, as Sir P. M. Metah said during its unveiling ceremony, "not only for the purpose of honouring the memory of Mr. Tata but also to some as a beacon of his countrymen, to follow in his footsteps." To him "life was real, life was earnest" and he trained his vision to be of a practical character which at the right psychological hour he was able successfully to realise and to act upon.

"The God," said Hesoid, "have placed labour before virtue; the way to her is at first rough and difficult but grows more smooth and easy the further you advance in it."

How to make Wax Flowers.

This art is a very beautiful one and affords both pleasure and profits. Very finest virgin wax, fixed from all extraneous matters, is necessary for good workmanship. Don't use wax that is either granular and friable. Tinned iron, copper or earthenware vessels are used for melting the wax. For increasing the ductility pure, white, fine Venice turpentine of an agreeable odour is added. Stir the mixture of wax and turpentine cons-

tantly with a glass or wooden spatula until thoroughly mixed. All contact with iron must be avoided, but if used the vessels etc. must be well and carefully tinned. When executing stiff leaves add 4 parts of spermaceti to every 8 of wax to give transparency. Much care and skill are necessary for colouring the wax. The colours, being finely powdered, are made into a paste by adding, little by little, essence of lavender or criton. When the mixture is perfect this paste is mixed with melted wax, stirring rapidly all the while ; and while the mass is still liquid it is poured into moulds of pasteboard or tinned iron, of the shape of tablets, and is then ready for use. Sometimes it is passed through fine muslin as it flows into the moulds.

Another way of mixing the colour is to tie up the pigment in a muslin bag and wave it within the molten wax till the desired tint is produced. To combine different colours it is only necessary to have 3 or 4 bags containing different colours, and to employ as much of each as shall have the desired effect. These bags, instead of being spoiled by dipping in wax already containing other shades, have only to be rinsed in pure water to refit them for colouring other wax. The colours mostly used in making wax flowers are purest qualities of white lead, vermilion, lake, carmine, ultramarine, cobalt blue, indigo, Prussian blue, chrome, Naples yellow, and yellow ochre. Greens and Violets are chiefly produced from mixtures of the above.

There are two methods of manufacturing the artificial wax flowers The first consists in steeping liquid wax, prepared in the above manner, in little wooden moulds rinsed with water, around which the wax forms in a thin layer, so as to take the form of the mould, and thus present, when detached from it, the appearance of the whole or part of a flower. In this way lotus, jasmine, tuberose and other simple flowers are obtained with much rapidity.

The branches are also made with wax, softened by heat, and moulded with the fingers round a thread of wire.

The leaves and petals of flowers are cut out of sheets of coloured wax of the proper thickness. These sheets are glossy on one side and valvety on the water.

To express the veining of leaves they are placed in moistened moulds and pressed with the thumb sufficiently to get the impression, which is accurately copied from nature.

The petals are made to adhere simply by presure ; the leaves are placed on a little foot stalk and the latter fastened to the stem.

The methods of making moulds for the accurate imitation of leaves is as follows : A natural leaf of the plant it is wished to imitate is spread out on a flat surface of marble It is lightly but equally greased with olive oil, and surrounded with a wall of wax, which must not touch it. Then in a small vessel containing a few spoonfuls of water a few pinches of plaster of paris are to be thrown and briskly stirred till the liquid has the consistency of a thick cream. This is poured over the leaf and left till it is well hardened. It is then lifted up and the leaf detached, when it will be seen that the plaster has taken a perfect impession of every vein and indentation. Such moulds are rendered far more durable if they are impregnated, while warm, with any drying oil. This gives them greater solidity, and prevents

their crumbling from frequent immersion in water.

It is needless to impress strongly on all makers of wax flowers the necessity for having all tools and moulds completely moistened with water, otherwise the wax will be constantly adhering, and preventing neatness of workmanship.

The other method of making wax flowers is as follows : Cut an 18 in. square sheet of glass. Put some soft soap in hot water, in a water bath, and stir until it lathers. Warm some of the prepared and coloured wax, adding a little balsam fir. When the soap water in the bath is blood warm, and the coloured wax melted, steep the glass in the water, take it out, plunge it into the warm wax, and when it has an even coat of wax on it replunge it into water, so obtaining a smooth sheet of wax. Lay this on the board, dry it, and lay a natural leaf on it, making the veins on the wax by pressing the with the thumb nail Cut out the shape of the leaf with a sharp penknife, and curl by bending over the finger or back of the hand. Join the leaves by the aid of fine wire, and mount under a glass case. Practice in making leaves will lead to the making of flowers, which are more difficult than fruit or leaves, as there are no moulds. Take a rose, for example ; every leaf has to be made separately, of very thin wax, and joined by wire. Keep on trying, however, as the same wax will do over and over again. The following short table serves as a giude to colouring. "Cast" means the colour the wax should be made while warm, "Applied" means put on dry after fruit is completed. Always get a fine specimen to copy.

Fruit or article.	Cast.	Applied
Apples.	Chrome yellow.	Greenish Touches.
Melon.	Chrome yellow.	Greenish Touches.
Cherries.	White or pale yellow.	Touched up with lake.
Egg Plums.	Chrome yellow.	Greenish Touches.
Filberts.	Green.	
Oranges,	Different parts yellow and red lead well mixed in the wax before Casting.	
Pears.	Yellow.	Touched up to nature.
Plums.	Prussian blue and red well mixed before Casting.	
Pineapple	Yellow.	Touch up with gamboge.
Pomegranate.	Burnt amber.	Touched up with purple.
Peach.	White.	Touched up with Chrome yellow and lake.
An egg.	White.	Touched up with Chalk.

Cleanliness is indispensable; not a particle of dirt must be near the work. In mixing the plaster, always remove all traces of one lot before preparing the next.

We shall give the minute process of making wax fruits in our next issue.

Bamboo Works—I.

It would occupy a volume even to enumerate by name all the uses to which the mature bamboo stems are put. An eminent authority has therefore rightly said that "to the inhabitants of the regions where the bamboo luxuriates, it affords all the materials required for the erection and furnishing of the ordinary dwelling house." Before proceeding to enumerate the ornamental and artistic uses of bamboo, it would not be out of place to give here some of its domestic uses. The above named authority continues: "Every person in India is familiar with the simple yet clever way in which the bamboo is cut up and split into bands of every size or thickness so as to allow of its being used in the manufacture of mats of any degree of quality, from the exceedingly fine mats made at Midnapur in Bengal, to the ordinary coarse mat extensively used in house-building. Thin strips of bamboo tied with strings are made into elegant door *tatties* (or curtains). Hollow bamboos are beaten here and there and cut at the nodes, lengthwise, and thereafter opened out and flattened into slabs which may be used for the seats of chairs, tops of tables, beds, or other articles of furniture. In fact, everything necessary for the erection and furnishing of a comfortable house can be obtained from the bamboo. The large karen houses, each of which constitutes a village by itself, and which is large enough to contain as many as 200 to 300 persons, are entirely constructed of bamboo. Fishermen frequently build bamboo houses over the rivers. The greater part of the people in Eastern India and Malay live entirely in bamboo houses. Bamboo bridges are frequent all over India. A complicated mass of uprights, in all directions, supports a pathway resting upon a few horizontal bamboos attached to the uprights. To the newcomer, bridges of this nature seem most insecure, but if in good condition they may be ridden over with perfect safety. Bird cages are made of bamboo sticks.

The large hollow species are well suited for aqueducts, waterpails. pots, cups and other vessels. Pieces of thick bamboos from three to six feets in length, with the partitions perforated, so as to form long pails, are carried by hill watermen, suspended over the back by a bamboo string passing across the forehead, instead of the water skin used by the *bhisti* of the plains. From these long tubes the water escapes with the gurgling noise, but it may be carried for days without either getting warm or being in any way spoiled. A single joint of a green bamboo is frequently used as a cooking-pot, the rice and water being placed inside and the mouth covered up; this primitive pot is placed on the fire until the rice is cooked. Spoons and knives are meanwhile being cut by the cook from the nearest bamboo clump. A simple ladle is made by cutting down to a handle the upper portion of a joint, leaving about 2 or 3 inches of the bottom as a large spoon or ladle. By the aid of this ladle the food when cooked is divided, and by means of the knife made of the hard outer portion of the stem, fish or other animal food may be cut up. In fact, every domestic appliances may be made of bamboo, including the pail used in milking cows and the churn with which butter is prepared. In the Naga country a section of a bamboo is used for stamping out circular rice-biscuits required in certain religious observances. All sorts of agricultural implements are also made of

the bamboo, and the appliances of spinning cotton and wool, and also for reeling silk, are often constructed of the same material. It is also used as a paper fibre.

The fisherman makes his oars, masts, fishing appliances, baskets, and even his hooks, of bamboo. One of the most curious hooks *perhaps in the world* is the one in common use in Bengal and Assam. This consists of a short piece of well-seasoned bamboo, say 3 inches in length and 1/8 of an inch in thickness. The string is attached to the middle of the twig, which is then bent into the shape of the letter U. The bait generally used is the common green grass-hoper, the head of which is plucked off and rejected. The two points of the bent bamboo twig are now inserted into the open end of the body and the baited hook dropped into the water. The upper end of the string is attached to a small piece of bamboo, about a foot in length, and left floating in the water with the baited hook suspended. The fisherman, from his dug out, drops these lines in likely positions and rows himself about from one to the other. When the fish cuts the bait the hook jumps open in its mouth, the extremities getting amongst its gills. Large fish are often caught in this way, the pain and inconvenience of the hook apparently preventing the fish from offering the resistance which would at once set it at liberty. The common and characteristic harpoon of Bengal consists of a piece of dendro cala mus strictus (a species of bamboo) about 6 feet long, cut into 8 or 10 long pieces about as thick as the little finger. These are smoothed and rounded up to within a foot of the top, where the bamboo is firmly bound with string or wire to prevent its splitting further. The point of each of these portions is armed with a metal pointed cap. The fisherman, ratting this instrument against the side of the dug-out, alarms the large fish from their hiding places amongst the weeds; and no sooner is a fish visible than with great adroitness the harpoon is thrown, and the sprongs spreading out as it enters the water, so larger space is covered as to leave the fish but a poor chance of escape if once the fisherman has been allowed to come sufficiently near.

All sorts of ingenius contrivances are made for catching fish, and in the majority of the cases they are constructed from the bamboo. Perhaps none are beautiful than the small and delicate basket traps which are placed here and there in walls of aquatic plants built artificially across portions of tanks or overflooded areas. Excellent fishing-rods are also made of the solid bamboo. These are in universal use all over India.

Although the bamboo is not suited for the construction of boats or canoes, it is by no means unusual to find a raft, composed of one, two or several large bamooos lashed together, used by fishermen and poor villagers on lakes, streams and rivers. Timber is also largely floated down the rivers upon bamboo rafts.

Bamboo is extensively used for making spear shafts, bows and arrows, clubs; poles for carrying loads, etc. The spiny bamboos were formerly planted in ditches around forts as a protection. The Nagas and other hill tribes use the hardened outer woody portion as knives and spears. The jungles and forests around villages are often covered for miles with these formidable weapons. Short sharp bamboo knives called *pangis* are buried amongst the leaves along the foot path in such a position as to go right

through the foot of the unfortunate traveller. Often three of these are arranged, two sloping forward and the other facing the traveller on his approaching the village. The foot is by accident placed between these, and being cut by the one in front, is rapidly withdrawn, only to have the other two violently driven in from behind. Sometimes thousands of these pangis, both visible and invisible, cover the entire surface of the ground, —so much so that the village is unapproachable to any person but the inhabitants who are familiar with every turning that has to be taken to escape this formidable bamboo defence. Pits are also dug, the bottom of which are full of knives, pointing in every possible direction. The mouth of the pit is cleverly covered with leaves, and the animal or man who places his foot upon this trap falls to a fearful and certain death. Crude scabbards are also made of the bamboo, and handles for swords, knives, axes, spades, etc.

All sorts of curious musical instruments are made of the bamboo—from the fife to the crude violin with its two or three strings. The strings are prepared from the green outer layer of the stem carefully cut, and when tightened give out a dull musical tone. In Manipur and the Naga country the hill tribes prepare an exceedingly curious jew's-harp from the bamboo. This consists of a thin piece of bamboo not unlike the common musical pitchfork in size and shape, only that it has three instead of two arms, and is not more than 1/8 of an inch in thickness. This is placed in the mouth just as with the jew's-harp, and a monotonous music is produced. Perhaps the most amusing musical contrivance is the bamboo Æolian harp, made in the Malay Peninsula. The bamboos in a village clump or far away in the jungles are perforated here and there in such a way as to keep whistling in all tones at once as the wind blows through the culms. The sound produced in this way has been described as at times soft and liquid like the notes of flute, and again deep and full like that of the organ. A kind of very curious whistle is used by the Chinese for driving away evil spirits, etc. Several holes are pierced in a piece of bamboo, two of the natural knots being left, one of which offers an opening out in a slope; to each extremity are fastened two long strips of paper from 15 to 18 feet in length and 6 to 8 inches wide. A string is attached to a groove made in the bamboo, and when there is a little wind, this curious kite is sent aloft, remaining in the air as long as the wind is strong enough to keep it up. In this position a monotonous whisthing is produced, resembling at times the noise of a jet of steam, or the sighing of the wind in trees.

The *auklong* of the Malays is a very agreeable instrument. It consists of a number of hollow bamboo-joints, of various but selected length and thickness, which are cut out below and hang down from a bamboo frame. These give various swinging tones and strength, according to their size, on being beaten with a bamboo staff. On the occasion of festivities, such as marriage circumcision, etc., Malayas greatly use the green halms of bamboo (especially the larger sorts), and have them put in specially prepared fires. The air enclosed in the joints gets heated, and the joints burst with a heavy report, which varies in strength from that of a pistol to that of a small gun, according to the sort of bamboo used, smaller halms being usually added which keep up a continuous rattling and crackling noise."

(*To be continued.*)

Ebonite and Vulcanite.

How many things are made out of these two materials, but no one cares to know what are these and how the articles are manufactured from them. Ebonite and Vulcanite are practically the same thing, the main difference being in the colouring agents used. They are made of India-rubber and sulphur, practically the same as vulcanised india-rubber but a higher temperature, and time, are necessary for vulcanising the compound. To prepare it as sold in the forms of fountain pens, toilet and other fancy articles, the rubber is worked in a masticating machine with the proper quantity of sulphur, and when thoroughly mixed a sufficient quantity is put into a mould of the right shape made of plaster-of-Paris, or other material which will not combine with sulphur and exposed in a steam boiler to a heat of 315 deg. F, and a pressure of about 12 lbs. to the inch for a couple of hours. It is then removed from the mould, and finished, and polished exactly in the same way as ivory. It is absolutely necessary that the material should be compressed as above stated while hardening; otherwise the resulting article will be porous. Guttapercha may be exactly treated in the same wa as rubber, but it is rather more troublesome to work. The vulcanite may be turned and carved in the same manner as ivory, with the advantage that it may be moulded to the required form without the great waste which attends ivory carving. It is also much less liable to fracture. The smaller the proportion of sulphur in the rubber, and the lower the temperature is used, the softer and more elastic will be the rubber. About 10, or 15 per cent. of sulphur and a temperature of 270—275 F. for 4. hours, will make an elastic rubber; 30 per cent. of sulphur and at a temperature of 315 F. for 2 hours will make a hard vulcanite like ivory.

To make good vulcanite about equal parts of rubber and sulphur with about 7 to 10 per cent. of lampblack are worked together in the masticating machine and then put into mould and vulcanised as above stated. A very useful vulcaniser for small goods is that made for dental work. It usually takes the shape of a cylindrical iron vessel with bolted-on lid, and fitted with a pressure guage, thermometer, and safety valve. Perforated divisions are put inside for the articles to rest on. With the simple vulcanisers the required heat is obtained by putting a little water in the bottom of the vessel, then lighting a burner underneath to create steam which soon reaches a high temperature and pressure. The safety valve is set to blow off at the proper pressure. Large vulcaniers are steam jacketed, which is no advantage except where high pressure steam is available. The heat for vulcanising should be slowly raised, the whole process taking about 4 hours, the final and highest temperature being 302° F. In large works the vulcanisiug chamber is a horizontal cylindrical oven with door in one end, free high pressure steam being used, supplied to the interior (without a jacket). It may be explained that the pressure and temperature of steam go together, and for 302° F the steam pressure would be 55lbs- on the gauge.

Vulcanite can be worked with ordinary wood cutting, sawing or turning tools, as it works much like ivory. It is necessary to keep vulcanite cool when working it, as it heats rapidly and softens with heat. At 212°F vulcanite can be bent and, when cold, will

retain its new shape. At a little higher temperature it is soft enough to be impressed with a pattern, or to be moulded.

The following hints have been culled from the "American Machinist," relating to the working of ebonite.

The best qualities show on fracture a brightness of the nature of jet, and the poorer sorts a corresponding dullness. Although an apparently easy substance to machine, its wearing effect in cutting tools is comparatively great. In sawing, turning, plaining, or milling, the best speed is that at which brass is machined, and milling should always be accompanied by the free use of soap and water, having regard to the fact that a milling cutter is an expensive tool ; but for turning or sawing, lubricants are in the way, on account of the spattering round of ebonite cuttings and soapy water.

When turning ebonite it is always preferable to leave the tools dead hard with a lot of "rake" on, and to take as deep a cut as possible, with a slow feed. Herein will be found the advantage of the tool holder system for turning tools, in which the cutter can be taken out and replaced by a fresh one, saving thereby a good many journeys to the grind stone ; for the moment a cutter becomes dull, which is frequent, instead of cutting it "burns" the surface of the material, and of course, militates against the production of good work. When tapping ebonite, use soft soap as lubricant.

Oil should never be used as it works into the material and in time rots the thread. Taps made of rod brass will be found useful, for if a dozen or two holes are executed with an ordinary tap, it will be comparatively useless on metal. Brass taps are easily made, and last almost as well as steel. Reamers of brass can be used in the same manner ; an ordinary nose type with four saw-slits made in the end, and a tapped hole admitting a taper screw for expanding the tool as it worns out, as is handy and as cheap a method of reaming holes in ebonite. When worn, it can be headed up easily and made ready for use again. In shops where ebonite is used it is nearly always found necessary to do a lot of sawing, and it will be found best not to use expensive tools. The writer has seen good saws – properly ground for clearance — rendered useless after a day's work on this material, and has found sheet-steel saws as good as the more expensive ones for cutting, besides being more readily sharpened, the necessary clearance being given to them by setting the teeth over sideways. Although of a brittle nature, the thinnest sheets can be worked in the press up to a thickness of about ·02 inch, keeping the tools and materials warm by means of a gas-jet, and, although the stampings come out rather rough on the edges, they will be found suitable for jobs where a smooth edge is not desired.

In polishing ebonite after taking all tool-marks out with emery paper (commencing with F.F. and finishing with No. 2 blue black French paper) a lap of hard felt charged with bath brick and oil is used, after which another lap charged with rotten stone and oil will be found to give good results ; at the same time taking care not to exercise too much pressure for an excess of friction "burns" the surface of the ebonite, rendering it incapable of taking a high polish. If a dead finish is desired all that is necessary. after using the emery cloth, is for the surface to be rubbed over with a cloth damped in parafin. Write to Montogomary Ward & Co., Chicago, U. S A., for estimates and the machines for starting a factory, mentioning INDUSTRY.

The Citronella.

ANDROPAGON NARDUS, *Linn.*

HABITATION.

It is a kind of grass common in the plains and lower hills of the United Provinces and Punjab and is extensively cultivated in Ceylon and Singapore for the manufacture of oil of Citronella. It is also abundant about Travancore. As cultivated in Ceylon it often rises to a height of 6 or 8 feet. It is most readily recognised from all the other species by its rufous colour, shortspikes, and, narrow leaves.

CULTIVATION.

In Ceylon it is raised from seed and planted like guinea grass, and will give 2 or 3 crops a year. When fit for cutting, the grass is carried to a large boiler.

DISTILLATION OF THE OIL.

The leaves are distilled with nearly double their weight of water, and yield over 3 ozs. of essential oil from 1 cwt. It is estimated to give about three dozen bottles of oil to the acre, but the demand is limited, and price fluctuates from 2s. 6d. to 4s 6d. a bottle. At the latter price it pays handsomely, while at the former it little more covers expenditure. A still capable of turning out a dozen bottles a day, costs £300. The pure oil is thin and colourless, with a strong aromatic odour, and an acrid, citron like flavour.

The average exportation of citronella from Colombo is about 40,000 lbs. valued at £8,000 valued at about 4s. 1d. per lb. It is largely used to give the peculiar flavour to what is known as "honey-soap."

CHEMICAL COMPOSITION.

Dr. Wright wrote that the essential oil of citronella mainly consists of an oxidised substance boiling near 210°, which becomes to a certain extent resinized, losing partially the elements of water, by continued heat. On analysis it gave quantities which would agree with the formula $C_{10}H_{18}O$, a formula corroborated by its behaviour with bromine, zinc, chlorine etc. Prof. Gladstone, who experimented with citronella oil sometime previous to Dr. Wright (1872), arrived at the conculsion that it owed its peculiar property to an oxidized oil which he called citronellol. This he separated by fractional distillation into two portions, the one boiling at 200,205°c., and the other at 199,201°c. The composition of each portion as found out by Gladstone would be represented by the formula $C_{10}H_{16}O$.

ESTIMATION OF FIXED OIL IN ADULTERATED CITRONELLA.

"The following method yield constant results when managed with ease, and when taken in conjunction with the sp. gr. of the sample, may give a good approximation as to the quantity and the class of the adulterating oil:—

"(a) Dissolve about one ounce of caustic potash in five ounces of alcohol in a flask, put on a sand bath, and leave to boil.

"(b) Take an eight-ounce beaker, and weigh into it 400 to 500 grains of the citronella; add two volumes of alcohol; boil on a sand bath.

"(c) When (a) and (b) are both boiling add one volume of the alcoholic solution of potash to the three volumes alcohol and citronella. Boil for a minute or so, and then fill to within an inch of the top with distilled water. Stir gently, and let boil for half an hour, or until the upper layer is perfectly clear, and the under-fluid semi transparent. Then allow to cool.

"(d) When quite cold, syphon off the under fluid (containing water, alcohol, potash,

and *soap*, if any fixed oil was in the sample) very carefully into another beaker, and boil gently. Acidify with dilute sulphuric acid. Add 50 or 100 grains of wax, continue gently boiling till the oily layer is perfectly clear, and then allow to cool gradually.

"(e) When cold, remove the cake of fat, dry and weigh. The weight, less 50 or 100 grains of wax, is the amount of fatty acid contained in the fixed oil. A simple calculation will show the amount per cent of the adulterant in the citronella."

As a Paper Fibre.

A correspondent, writing in the *Ceylon Observer*, suggested the use of citronella grass as paper material. In extracting oil from the grass, it is boiled or subjected to steam, under preassure, and as this is one of the first operations to which the raw material is subjected in paper manufacture, grass which has been thus treated should be much more easily utilised than material not previously boiled. Citronella grass, like esparto, can be supplied entirely free from knots, which is a great advantage in paper manufacture. At present about 3,500 tons of citronella are available for export in Ceylon.

Medicine.

The oil is regarded as officinal by the Indian Pharmacopœia ; the oil being imported from Ceylon. In its properties it closely approaches that from A. citratus (the lemon grass.)

Dr. Irvine, in his *Materia Medica of Patna*, says that the infusion of the leaves in doses of ¼ to 2 ozs is used as a stomachic.

Domestic Use.

Dr. Trimen wrote that this grass is largely used for thatching purposes in Ceylon.

Singhbhum and its Industries.

Hitherto Singhbhum was one of the most industrially backward districts in Bengal, but by the opening of the Tata Iron and Steel Co., Ltd., at Sakchi it bids fair to become one of the most important districts in the new Province. Before the discovery of the valuable iron ore, copper mining was carried on and is still now progressing. Other important minerals of the district are gold, iron, manganese, mica, soapstone and limestone.

Copper.

It was first in 1833 that Mr. Jones, who was then engaged in investigations regarding the coal of Bengal, brought to notice, the existence of copper in Singhbhum, in a paper on the subject published in the *Asiatic Researches* of that year. But it was 1854 that Captain (afterwards Colonel) J. G. Haughton, Principal Assistant at Chaibasa, gave a full account of the copper veins and old mines in the district in a paper published in the *Journal of the Asiatic Society of Bengal*. He stated that in 1847 he ascertained beyond doubt that copper existed in Singhbhum and had a small quantity of the ore rudely smelted. In 1857 a company was started, mining commenced at Laudu and Jamjora, and fine raw ore was turned out at the rate of from 1200 to 1300 cwts. a month, and delivered in Calcutta by way of Purulia and Raniganj. Owing to heavy establishment charges the company was dissolved 1859. In 1862 a second company, called the Hindusthan Copper Co., was formed with a capital of £120,000 in 24 000 shares. Its operations were not more fortunate than those of the first company and so it was dissolved in 1864. The local Rajas and Zemin-

dars worked crudely for a few years and by 1870 all operations had been discontinued. From 1902 one copper mine at Matigara is being worked by the Cape Copper Co, Ltd., Mahulia,

GOLD.

Before October 1890 some 15 or 16 companies had been formed, comprising names —Patkum Patpat, Dhadka, Sonapet etc.— that are even now only too well remembered. Within 3 months 32 companies with an aggregate capital of 151 lakhs of rupees, were in existence. By the end of 1892 there were not more than a couple of the mining companies left and these were dragging out a very precarious existence. Of late years attempts have from time to time been made to resuscitate the Sonapet companies, and a limited work has been done on the gold quartz veins of Pahardiha, near Anandpur, where a small "patch" of rich golden specimen was discovered. It has been found that native methods of washing are more economical and profitable than that of the expensive European methods.

IRON.

Iron ore is frequently found on the surface, usually on hill slopes and is worked in places. Four iron mines at Turamdih, Talsa, Kudaha and Hakagara in Dalbhum belong to the Bengal Iron and Steel Co., Ltd., and between the years 1900-01 and 1904-05, the average annual output was 7,641 tons, the labour force averaging 504 persons. In 1907 altogether 11,036 tons, valued at a lakh of rupees, were extracted, and the average daily labour force was 300. No machinery was employed, the mines being merely surface workings, and the ores being found at a depth of 2 to 20 feet. In 1908 the total output was 18,907 tons, and the average daily labour force was 666. In 1907 the Tata Iron and Steel Co., Ltd , began to erect their works near Kalimati. Their works were brought into operation at the end of 1911 and are producing iron and steel in considerable quantity, including over 25,000 tons of steel rails in 1913. The company has great future prospects. It will not only enable the Government and the public to purchase many steel articles of local manufacture which are now imported, but will also help to develop subsidary industries, particularly those for the production of coal tar and its dyes and sulphate of ammonia, for which a ready market can be found in India.

MANGANESE.

In 1907 one firm was able to raise about 2,000 tons as against 1,000 tons in the previous year, valued at Rs. 3 per ton at the pits mouth. Messrs Martin & Co., of Calcutta, hold prospecting licenses for iron ore, manganese and chromite in this district, but not much manganese of value has been discovered, though iron ores of excellent quantity have been found in the Buda and Notu hills. The Company has undertaken a survey for a light railway from Monoharpur to the foot of the hills.

MICA.

In 1907 03 an attempt was made to work a new mica mine in Dhalbhum, but only 6 or 7 maunds of green mica were raised. The mine could not be worked more successfully owing to hard stone covering the supposed mica vein.

SOAPSTONE.

This is also found in Dhalbhum and is made into plates, bowls, trumblers, images, and the like, but only on a small scale. It is turned on rough lathes to the shape required. The products are exported to Cal-

cutta, Puri and other places, but they are very brittle, and a whole consignment often arrives in a broken state. They are 11 quarries at work, leased out to private individuals, which in 1907-08 gave employment to 310 labourers, the total value of stone pots manufactured, being Rs. 16,500. No machinery is used, and the shafts are not deep.

LIMESTONE.

Limestone occurs as *kankar*, and is not only used for local purposes, but is also collected and burnt for export to places along the railway. The Sutna Stone & Lime Co., holds a lease for lime-stone in the Lota hill, and the quantity of lime exported during 1907-08 was 225 tons valued at Rs. 2,000. Messrs Hoare, Miller & Co., of Calcutta, hold a lease for limestone in the vicinity of Chaibasa, but did not extract any limestone in 1907-08. It was reported that the development of their mine was delayed owing to uncertainty as to where railway transport facilities would be provided.

COCOON REARING.

At present, the most important industry of the district is the rearing to tusser cocoons, which is carried on extensively, in the Kolhan. Singhbhum and its neighbourhood have been described as the heart of the tusser rearing industry of the whole of India, where alone tusser sericulture is pursued in its completeness, and where some of the best practices prevail. The best cocoons and the largest quantity are produced here and sold in the Chaibasa *hat*, which is attended by weavers and *mahajans* from Bhagalpur, Patna, Birbhum, Hazaribagh, Bankura, Burdwan, Murshidabad, Bilaspur, Sambalpur, and the Southern Maratha country, all seeking their stock of cocoons. The industry is chiefly carried on by Hos as a subsidary occupation to agriculture, and it is estimated that in the Kolhan the average number engaged in it is 4,000. The industry has much declined. The causes of decline, as ascertained by Mr. N. G. Mukherjee, who made a special inquiry into the tusser silk industry in 1905, are :—Government duties and dying out of trees which are necessary for rearing and feeding the worms. Mr. F. Smith, Deputy Director of Agriculture, Bengal states:—". . . .Rearers in France and Italy have the patience to wait ten months for the eggs to hatch and give cocoons of a constant type, while Indian tusser rearers do not like to wait for the eclosion of the best months (the wild *muga*) because of the uncertainty of eclosion, but prefer their domesticated cocoons. This seems to me one of the chief reasons of the decline of tusser cocoon rearing in Bengal. Formerly rearers used to repair to the forest for their new supply of seed cocoons every third or fourth year, but they do not seem to have done this for the past 9 or 10 years." The destruction of trees for firewood is another cause of the decline of the tusser industry. "Probably, however, the most important cause of the decline of the tusser industry in Bengal is the low prices now obtaining for tusser silk"

To remedy this state of affairs a model tusser silk rearing station was established at Chaibasa in 1906, an area of 55 acres being taken up one mile outside the station. Here buildings have been erected and young *Asan* trees (the tree that the tusser worm prefers) planted every 10 feet

apart. It is proposed to take in every year wild *muga* seed, domesticate it on the farm and issue the domesticated tree to rearers, as by domestication the moths eclose regularly in May and June. It is hoped that by this means their stock will be strengthened and the decline stopped.

OTHER INDUSTRIES.

The other industries of the district need only a few passing remarks. Coarse cotton cloths and blankets are woven by the village-weavers on looms of a primitive type. They are strong and durable, and are therefore preferred by the lower classes to machine-made stuffs. In the Kolhan a hard fissile rock, generally of a bluish grey, which readily splits into slabs, is found in abundance, and is used extensively for house-building: Most of the houses in Chaibasa are built of this rock. Baskets are made of bamboos, mats of the leaves of the date palm, and rope from the *Sabai* grass and a number of other plants and creepers.

Lac is raised on *palas*, *bair* and *Kusum* trees, the last two being preferred. Kusum seed is also pressed for oil, which is used for cooking and lighting. Oil is pressed from the various oil seeds and from the fruit seed of the *mahua*, *karanj*, *nim*, and *sutrani* trees. The oil-press is a primite one. It consists of two horizontal logs of timber, placed one upon the other, and secured at both ends, by strong perpendicular posts which run through the two horizontal pieces of timber: the oil-seed contained in small bags or baskets is placed between the two timbers and the oil pressed out. The oil produced is consumed locally, and the trade is mostly in the hand of Tamarias.

TRADE.

The chief exports are timber, paddy and rice, pulses, oil seeds, sticklac, iron, tusser silk cocoons, hides and and sabai grass. The chief imports are salt, cotton yarn, piece goods tobacco, brass utensils, sugar, kerosine oil, coal and coke.

The Eri Silk.

(Owing to persistent enquiries regarding the cultivation of Eri silk, we make no apology for reproducing these notes of that veteran expert, Mr. T. N. Mukherjee—Ed. I)

The Eri silk-worm is now reared in some parts of Northern Bengal, but chiefly in Assam. It feeds on the leaves of the Castor-oil plant, and is therefore scientifically known by the name of "Attacus ricini," the botanical name of the castor oil plant being "Ricinus communis."

2. There are several kinds of this worm, all of which produce an inferior kind of silk-cocoons, which are not reeled like the Mulberry silk cocoons, but spun into thread like cotton and wool. The cloth woven from this thread, though coarse looking, is soft and durable and is highly suitable for ordinary wear. It has, therefore, largely come into use of late both among Europeans and Indians. The supply, however, is not equal to the demand.

3. It is highly probable that the production of this silk can be much increased owing to the following reasons:—(a) The castor-oil plant either grows wild or is largely cultivated for its seed in many parts of the country; (b) cattle do not eat the plant, and it is not required to be protected by fences like the mulberry plant; (c) the caterpillers of this silk eat leaf for a very much shorter period than the mulberry silkworms before making cocoons; and (d) the rearing of this silkworm is less troublesome than that of the mulberry silkworms.

4. The castor oil plant which is now

usually grown for seed only, might be utilised to yield leaves as well for feeding the worm, and thus a new source of income might be opened out for the peasantry, specially their women, who, since the demand for home-spun cotton yarn ceased, have had no profitable employment for their leisure hours. The production of the cocoons, the work of spinning and weaving them into cloths and the trade both in the raw and manufactured article may give employment to thousands of people, and not only an additional source of wealth be created, but an actually increased demand for an Indian-made article, met by an increased supply. The magnitude of gain to the country, if the experiment succeeds, cannot therefore be over-estimated.

5. Taking all this into consideration, public spirited gentlemen, interested in such matters, are invited to undertake experiments for rearing the Eri silk-worm and to take steps to introduce its cultivation among the peasantry in their neighbourhood. The following brief instructions for rearing the Eri silk-worm have been prepared for the guidance of such gentlemen.

6. Cocoons with living chrysalids inside or eggs are called live cocoons. The live cocoons should be placed within a bamboo bird-cage, and put outside in a verandah, or some open place or in a well-ventilated room, but not exposed to the sun or rain In about a month's time (three weeks in the hot weather), the moths which resemble butterflies will come out of the cocoons. Some of the male moths may fly away for for a time, but the females remain in the cage, if the door of the cage is left open. The escaped males return after a short time. Small pieces of cloth or paper should now be placed at the bottom of the cage. After about eight hours, the female butterflies will begin to lay eggs upon the cloth, or paper or on the garlands of cocoons, when no cage has been used. In twenty four hours they will have finished laying the eggs, when the moths should be thrown away. The eggs should then be carefully scraped or picked out of the cloth, or paper with a blunt knife or finger nails, and kept in one thin layer on a 'Dala' or basket in some cool place. Care should be taken that ants, spiders or rats do not get access to them. The eggs may in this way be produced at home, or, if desired, pieces of cloth or paper with the eggs on them can be obtained from Assam. On arrival, the eggs should be taken care of, as stated above, against ants, rats, spiders and other vermins.

7. Bamboo racks with shelves called "Machans," should now be got ready in a clean room as well as some flat, shallow bamboo or grass baskets, called 'Dalas.' A stickfast, made by boiling together a little mustard oil and 'Dhuna' (resin of the 'Sal' tree, 'Shorea robusta,' or any other resin) to which a few drops of the milk of 'Colotropis gigantea' (Vern, Akanda, Ak, Madar) may be added, should be applied to the posts of the bamboo rack. The object of this is to prevent ants going up the posts to the baskets. If the above preparation be not avaliable, some other sticky matter such as, tar, castor oil etc., may be applied to the posts. When the 'Machan' is got ready, the Dala' with the eggs should be placed on it.

8. In eight or ten days, the eggs begin to hatch and the worms to come out. The eggs do not hatch all at once. It takes about four days for all the eggs to hatch. On the

first day of hatching, at about 1 p, m., some entire castor-leaves, but small and tender, should be placed on the eggs out of which worms have come out. The newly hatched worms will get upon the leaves and begin to feed. This is the first feed, the first feed being given at 1 or 2 p. m., though hatching commences early in the morning. After four hours, i. e., at about 5 p. m., take up each castor leaf one by one by the stalk with the worms feeding on them. Brush back into the 'Dala' any uuhatched eggs that may be found adhering on the back of them, but leave the hatched worms undisturbed upon them. Then put these leaves with the worms on them in another 'Dala' and put this 'Dala' on the lower-most shelf of the rack. This will be your first batch of hatched worms. Of course, if necessary, more than one 'Dala' should be used to prevent over-crowding. It should, however, be remembered that one 'Dala' holds as many newly hatched worms as would go into 80 'Dalas' when these worms are full-grown. So at about 5 p. m., the second feed is given. The second feed should not consist of entire castors leaves, but leaves chopped up fine. Chopped leaves should be given until the worms grow to about an inch long; after that entire leaves should be used. The third and the last feed on the first day shou'd be given at about 9 p. m. The first batch of worms should be fed thrice daily for 4 or 5 days: once early in the morning, the second time in noon and the third and the last time at about 9 p. m.

9. In the afternoon of the second day, some small tender entire castor-oil leaves should again be placed on the 'Dala' containing the unhatched or the hatching eggs The hatched worms, as before, will get upon the leaves and begin to feed upon them. At about 5 or 6 p. m., that is, when there is still plently of light, the leaves with the worms on them should be taken up, the eggs adhering on them should be brushed off into the 'Dala,' and the leaves with the worms placed on a second 'Dala.' The worms of the second day's hatching will be the second batch. The second batch of worms should be placed on a higher shelf of the rack than the first batch. There will be some more hatching on the third and the fourth days. The third and the fourth batches of worms should be placed on still higher shelves of the rack. After the fourth day no more hatching is likely to take place and the remaining unhatched eggs should be thrown away.

10. To equalise the worms obtained in the four days' hatching the later worms should for four or five days be fed oftener than those of the previous days. The first batch of worms should be fed thrice daily, the second batch four times and the third and fourth batches five times until all the worms are equalised.

11. After all the worms have been equalised, they should be fed together regularly five times a day until they spin, i. e., at 5 a. m., 9 a. m., 1 p. m. 5 p. m., and 9 p. m. It should be remembered that at the earlier stage the worms should be fed on chopped leaves, and afterwards on entire leaves.

12. The Eri silk-worms moult, i. e., cast off their skins four times. At intervals of 4 or 5 days, the worms will be found remaining motionless. This condition will indicate that they are moulting. At this time they should not be fed. The worms themselves will not eat at these times, and it will hurt them if leaves are now heaped

upon them. There will thus be four fasting days on the four moulting days.

13. The droppings of the worm and the refuse leaves should be regularly removed every other day. This can be done by lifting up the worms by taking hold of stalks of the leaves upon which they may be feeding at the time, and gently putting the leaves with the worms on them in other 'Dalas.' The first 'Dalas' being thus emptied may be easily cleaned. During the days when the worms are fed on chopped leaves, entire leaves may once be given every other day, in order to allow the worms being removed to other 'Dalas' for cleaning the old 'Dalas.' A more convenient way of keeping the worms clean is to spread a piece of thread-net, of about 3/4 inch meshes, over the worms and to put the fresh leaf on the net The worms will get through the meshes of the net to feed on the leaf above, when they can be easily removed to clean the 'Dalas.'

14. After 15 days' feeding in hot weather, and 25 to 30 days' in the cold weather, the worms will attain maturity and spin cocoons. It is almost impossible to say by their appearance when the Eri silk-worms are ready to spin. At this time they cease eating. They also get rich green in colour shortly before this period. They may, however, go on eating for a day or two longer even when they are of this rich green appearance. They also rove about when they are ready to spin, but they do the same when they are hungry. When ready to spin the worms get smaller, but this is no exact indication to go by. The Eri silk-worms when ripe for spinning cannot, therefore, be all picked up and kept separate on spinning screens for making cocoons as the mulberry silk worms can be.

15. When the worms become ripe for spinning, dried twigs or bamboo branchlets may be thrown over them, or better still tied at regular interval: on the posts or cross pieces of the bamboo-rack, so that the roving worms laying hold of such things may spin their cocoons. When all the worms have finished making the cocoons, these should be separated from the twigs and put on 'Dalas' in thin layers. They may now be put out in the sun for an hour or two if they feel damp, but they should not be exposed for a long time, lest the chrysalids inside the cocoons get killed. Unlike mulberry cocoons, pierced Eri cocoons are more valuable than unpierced cocoons. All the moths should therefore be allowed to come out and lay eggs for a second crop of cocoons.

16. The pierced cocoons can either be sent to Calcutta for export to foreign countries or locally spun and woven into cloth.

Indian Sugar.

THE NEED FOR PROTECTION.

Sir Roper Lethbridge writes to the "Westminister Gazette" :—

May I suggest to the champions of cane- and beet-sugar respectively that their rivalry is quite unnecessary? If the silicon that is found in cane and not in beet sugar improves the enamel of our teeth, that does not greatly affected the value of beet-sugar as a food. The simple fact is that they are both valuable foods, and ought both to be valuable aids to the agricultural industry—beet in the United Kingdom, cane in India and our tropical colonies; and both deserve the best encouragement the Government can

give them. The war, that has temporarily stopped the main supply of beet-sugar at its sources in Germany and Austria-Hungary offers an ideal opportunity of giving that encouragement, both at home and in India, without offending the most ardent Free Trader.

In India, Mr. Gokhale—that great Indian whose loss we are all deploring to-day —and the whole body of Indian members of the Viceroy's Legislative Council have shown us how to give that encouragement in the debates on the motion of the Hon Pandit Madan Mohan Malaviya, on March 9, 1911 and again on March 17, 1913 and on frequent subsequent occasions. What they say is virtually this: Let the Government of India consider what Dutch Government of Java has done for the Javanese sugartrade with India, and let them go and do likewise. In the year 1888-89 Java sent to India sugar to the value of less than £17,000; last year 1913-14 (see Blue book. Cd 7766 published last week, page 41) India had to pay to Java for imports of sugar, most of it refined sugar over nine million pounds sterling!

How was this done? The late Mr. Noel Paton, in his admirable Government monograph on sugar, quoting Sir John Strachey and every other official authority, showed that the vast Indian sugar industry, that formerly supplied half the sugar of the world that used to pay both the Government land revenue and the Government canal revenue that was indigenous in nearly every province, with every possible advantage of soil, climate and labour, was so nearly crushed b the bounty-fed sugars of Germany and Austria that a time when the Indian consumption of sugar was increasing by leaps and bounds the Indian acreage under sugarcane actually diminished by hundreds of thousands of acres. Then came the respite afforded by the Brussels Convention and the countervailing duties and things looked like mending. But what happened when these helps were withdrawn? The Dutch Government of Java promptly and boldly stepped into the breach—they gave the Java industry whatever amount of protection and whatever subsidies in the way of aided freights etc that it might need, so as to enable it (1) to secure any amount of capital to improve methods of cultivation and manufacture, and (2) to beat down all Indian competition. And the result is that at this moment Java is drawing more than nine millions sterling per annum from its exports of sugar to India —probably the biggest success in national commerce and industry that the world's history can show.

A long paragraph at page 42 of the newly published Blue Book, Cd. 7766, tells us of the immense efforts, extending over many years, and involving an enormous expenditure, that the Governments of India, and the local Governments have made to introduce the new and improved methods of cultivation and manufacture that are universal in Java. But how can it be expected that cultivators and manufactures will invest capital in this direction, when they know that, when all is done, the Dtuch Government of Java has only to give a further turn of the screw in the way of duties and subjects to rob them of all fruits of all thay have done? As Mr. Gokhale and all the Indian economists have pointed out, if the Government of India really wishes for trade in sugar, they must at least promise such countervailing duties as may be necessary.

Small Trades & Recipes.

Vast quantities of neem (margosa) seeds will be available from this month. They will simply rot. Why don't you prepare oil from them, which has a large demand by Kavirajes for leprosy and other skin diseases. The oil is very easily saponifiable and so a medicated soap can be manufactured also. The Bengal Chem. & Pharm. Works, Ltd., Calcutta, have already done so. Why not tread the same path on a small scale or why don't you collect the seeds and sell them?

There are various shrubs, creepers and plants in our jungles. Many persons collect those which have some medicinal or other properties and sell them. Others collect them and sell them as tooth brushes after cutting them into required lengths. Why don't you do so?

Why do you throw away the half burnt match sticks? Can't you cut them out a little and make them matches again for your own use? The writer has done so for a number of years and have saved much expense.

As the aniline and coal tar dyes are not available now-a-days why don't you turn your attention to your vegetable dye stuffs? There are 75 kinds of plants, trees, leaves, flowers, fruits, etc. in India from which all kinds of dyes can be manufactured. We shall enumerate them in a future issue.

BEST HAIR DEPILATORY.

Barium Sulphide, 1 part; wheat starch powder, 3 parts. Make into a cream with water. When required for use, spread it on the part and let it remain five or ten minutes then remove with a blunt knife. It temporarily reddens the skin. The *Medical Chronicle* and the *British Medical Journal* recommend it as the best and safest depilatory. The *Lancet* and the great Unna recommend equal parts of sulphide of barium, starch, and oxide of zinc. To be used as above.

PIC-NIC BISCUITS.

Take 2 ozs. of fresh butter, and well work it with 1 lb of flour. Mix thoroughly with it half a salt spoonful of pure carbonate of soda, 2 ozs. of sugar; mingle thoroughly with the flour, make up the paste with spoonfuls of milk; it will require scarcely a quarter of a pint. Knead smooth, roll a quarter of an inch thick cut in rounds about the size of the top of a small wineglass; roll these out thin, prick them well, lay them on lightly floured tins, and bake in a gentle oven until crisp. When cold put into dry canisters Thin cream used instead of milk, in the paste, will enrich the biscuits. Carraway seeds or ginger can be added, to vary these, at pleasure.

TO FATTEN FOWLS.

Mix together ground rice well scalded with milk, and add some coarse sugar. Feed them with this in the daytime, but not too much at once; let it be rather thick.

INDIAN CURRY POWDER.

Turmeric, coriander, black pepper, 4 ozs. each; fenugreek 3 ozs.; Ginger, 2 ozs.; cummin seed, ground rice, 1 oz. each; cayenne pepper, cardamums ½ ozs, each. All these ingredients should be of a fine

quality, and recently ground or powdered before weighing and mixing.

GLYCERINE JELLY.

Pure glycerine, 12 ozs ; White Soap, 8 ozs. ; bleached almond oil. 6 lbs. , oil of thyme, 2 drs. ; oil of bergamot, 4 drs ; otto de rose, 1 dr. Work the soap and glycerine together in a mortar, then gradually add the oils and work until the mass is well incorporated. This makes a soluble, transparent jelly for the toilet table.

CHEAP BLACK INK.

(4 as. per gallon.)

Boil 4 lbs. logwood chips in 2 gallons of water for 20 minutes. Boil (at the same time) 14 ozs. powdered gum in one quarter of water. When the logwood has boiled 20 minutes, add 4 ozs. of bichromate of potash and then the gum solution. Let all boil a a little longer, stirring well, then cool, strain and bottle.

Scientific & Industrial Topics.

Indian Wool.

Sheep breeding experiments, which are now being carried on by the Civil Veterinary Department in the United Provinces, are proving very satisfactory and it has now been found possible, by a system of grading up the country sheep with the merino breed, not only to produce a greatly improved quality of fleece, but to increase the annual yield of wool per sheep to more than five times that of the indigenous animal. As several private persons and estates are contemplating sheep breeding on improved lines, Mr. Oliver is shortly arranging for a consignment of merinos from Australia. Any one desirous of obtaining any of these animals should communicate with the Superintendent, Civil Veterinary Dept., Lucknow.

The Tata Hydro-Electric Scheme.

The scheme which will supply Bombay Mills with electrical power, has been more delayed than was expected, but this has added considerably to its success. The first steps in the scheme were taken in the life-time of the late J. N. Tata, and he spent no less than six lakhs of rupees in investigating its possibilities. The definite undertaking fell to the lot of his distinguished sons, who floated the present Company. The arrangements, which will supply the power, are very simple. By means of huge dams, three lakes are constructed in the Western Ghats, and water from them is made to fall 1,700 feet, by the power of which the current is generated and transmitted to Bombay. At the beginning a doubt arose as to whether the supply of water from the artificial lakes would be enough and continuous in the summer months, but the experience during the last summer has proved that the supply would exceed the demand. When the present scheme is in full working order, it will be possible to develop 125,000 horse-power, but this is thought to be insufficient to supply Bombay with all the comforts which an average citizen expects to derive from the present scheme. And to supplement its capacity it is believed that the Tatas have another scheme in view not far from the present site, which at less cost per unit is believed to be capable of supplying 60,000 horsepower. The existing company will be given the first option of subscribing for shares in the new venture, and it is likely that the two will work conjointly.

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People's Ed.

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Prompt Decision.

DO you know that success rides upon the hour of decision? You must not falter if you mean to succeed—for time and opportunity passes through the loophole of faltering.

There is a story of a father who attempted to redeem his two sons, who had been captured in war by the army of a tyrant. He offered his own life as a ranson, and a sum of money. He was informed that this offer would be accepted as a ranson for one son only, and he might choose which he would redeem. The afflicted father was only too anxious to save one, even at the expense of his own life ; but he could not decide which should die by choosing that the other should live, and in the agony of his dilemma he remained until both were executed.

Prompt decision in all matter that concern oneself is an accomplishment not only for businessman but also of men in all stations of life. "Irresolution" to borrow from Addison, "in the schemes of life which offer themselves to our choice, and 'inconstancy in persuing them, are the greatest cause of all our unhappiness."

How many young men we all know who have no rudder in their lives. Shiftless, purposeless, nerveless, aimless, characterless, they drift about from day to day without aim or purpose, without direction or plan ; they are creatures of circumstances. They have no strong purpose running through their lives, which alone can unify and give meaning to their faculties and powers. A chest of tools without a trade is of very little use, and a headful of faculties is but a chest of tools without the carpenter's purpose or aim. One without a definite aim in life can neither be useful nor happy.

A single stroke without a definite outline of the image in the mind might ruin the statue ; we should never strike a blow until we have decided upon the statue.

Some people seem to think that, if they pound away hard on the marble all day, if they only keep at work, no matter if they have no definite image in view, they will accomplish something. But no ; they would better never touch the chisel and mallet than spoil the block. It would better be left uncut than be ruined.

One with a purposeless life, a life which

acts upon impulse, never makes a strong character ; his ship does not draw any depth of water. He does not make much of a figure in a community, because no one can foretell to-day what he will do to-morrow, or whether he will do anything, because he may not feel like it ; he may not have the impulse or the decision ; he is like a ship at sea without a rudder ; if the wind favors him, he may drift into port ; if not, he may go to pieces on the rocks or float about indefinitely.

How fortunate is the man who possesses a mind superior to doubt and fluctuation ; who is disdainful of ease and pleasure, who laughs at opposition ; who feels within himself the power to will and to do, who believes in his lucky star, who has a sublime confidence in his own power to carry out whatever he wills ; who knows that no timid lingerings, no ghosts of distrust, no pleadings of if or buts, no doubts or misgivings, can keep him back from the trial : who can laugh at the menacing glare and the ominous tones of obstacles and opposition ; who easily knows and dares to do all that becomes a man ; who is larger than his calling, superior to opinion ; who cannot be intimidated by reproaches, nor bought by favor nor applause ; who is imprevious to contempt and ridicule, and who can laugh at scoffers and persecutors.

William Pitt was a remarkable example of definiteness of purpose and singleness of aim. From a child he was made to realize that a great career was expected of him, worthy of his renowned father. This was the one keynote of all his instruction. Wherever he was or whatever he did, whether in school or college, whether at work or play, he was never once allowed to forget this grand parental idea,—that great things were expected of him as a statesman. It was ingrained into every fibre of his being, and with such energy of purpose and determined aim, did he bend himself to this one task, that at twenty-two he was in Parliament, at twenty-three chancellor of the exchequer, and at twenty-five prime minister of England. What an inspiration is such an example of one unwavering aim ! He bent every energy, all his moral forces, and his imperious will-power, sacrificing everything that interfered, to this one, all-absorbing passion of his life.

Who can estimate the great advantage of this early training and direction of his studies ? He did not waste years, after leaving college, trying to make up his mind what he would better do, but rushed straight to his goal.

"Vacillation" said Voltaire, "is the prominent feature of weakness of character."

There is nothing like knowing one's weak points, and then guarding them, and bracing them up. There is nothing which will help a vacillating mind like forming a habit of always acting promptly and energetically. One should then never allow the contemplative or reflective faculties to continually bring up first one side and then the other balancing motives, and splitting hairs over non-essentials. The decision would better be final and irrevocable, and carried out with energy, even if something wrong, than for one to form a habit of forever balancing, contemplating, and procrastinating. After this habit of prompt decision has been pursued, even mechanically for a time, confidence in one's judgment will begin to be born, and a new spirit of independence will be acquired.

"The man who is perpetually hesitating which of two things he will do first," says William Wirt, "will do neither. The man who resolves, but suffers his resolution to be changed by the first counter-suggestion of a friend,—who fluctuates from opinion to opinion, from plan to plan, and veers like a whether-cock to every point of the compass, with every breath of caprice that blows,—can never, accomplish anything great or useful. Instead of being progressive in anything, he will at best be stationary, and, more probably, retrograde in all. It is only the man who carries into his pursuits that great quality which Lucan ascribes to Cæsar, *nescia virtus stare loco* ;— who first consults wisely, then resolves firmly, and then executes his purpose with inflexible perseverance, undismayed by those petty difficulties which daunt a weaker spirit,—that can advance to eminence in any line."

An evenly balanced mind, no matter how strong, will never accomplish anything if it lacks decision of will. A man who can see two sides to the question equally well can never be a prompt actor without a strong and decisive will-power. The arguments for and against any action come up before him so vividly, each side urging its claims, that, unless he has a strong will-power, he cannot make the necessary sacrifice of the one for the other.

And even when he has made his choice of one and sacrificed the other unless he has grit, tenacity, and unflinching determination, he will be thwarted again and again before he has accomplished his object, by the perpetual claims of the side he has sacrificed.

Thousands of men owe their failures in life simply to procrastination. Many a businessman has made his fortune by promptly deciding at some nice juncture to expose himself to a considerable risk. The vacillating man, however accomplished in other respects, is always pushed aside in the race of life by the determined, the decisive man who knows what he wants to do, and does it ; even brain must give way to decision.

It was no accident that gave Nelson command of the British fleet, a title, and a statue at Trafalgar Square. He gave the keynote of his own character when he said, "When I don't know whether to fight or not, I always fight."

Napoleon never hesitated in an emergency. He seized instantly what he considered the wisest course, and sacrificed all others, which he would not allow to tempt him by constantly arguing their side. It is a rare mind which has the decisive vigor which can choose instantly upon the wisest course, and sacrifice every other.

Napoleon was the master of Europe, until he seemed to lose the power of prompt decision. He lost Waterloo because he did not exercise that rare and decisive vigor which had ever before characterized him, which prompts to an immediate choice and sacrifice. He seemed to have lost that swiftness of decision which he had exercised in other great emergencies.

The decision must be intelligent. A mule may make a decision ; but his decision is to thwart, and his resolution we call mulishness. Do not confound obstinacy with manly resolution. Obstinacy is the dogged tenacity in holding to ill considered plans or objects, reason or no reason.

An educated will must be self reliant-

self-restrained, self.directed, and under self-control.

Sometimes a person encounters emergencies where he must make a decision, although aware that it is not a mature decision, approved by the whole cabinet of his mental powers. In that case he must bring all his comprehension and comparison into active, instant exercise, and feel that he is making the best decision he can at the time, and act. Many important decisions of life are of this kind,—off-hand decisions.

Feltham writes :—

"Irresolution is a worse vice than rashness. He that shoots best may sometimes hit the mark ; but he that shoots not at all can never hit it. Irresolution loosens all the joints of a state ; like an ague, it shakes not this nor that limb, but all the body is at once in a fit. The irresolute man is lifted from one place to another ; so hatcheth nothing, but addles all his actions."

A COMMERCIAL TRAVELLER'S MAXIMS.

I believe in the goods I sell. If I did not, I should leave the firm. You can't sell successfully what you haven't faith in.

I don't take long week-ends. Monday morning is a good time for business.

I have a theory that the total of orders has a direct relation to the number of customers called on—the unlikely as well as the likely. It works.

I used to shirk the difficult prospects—leave them to the last. Now I tackle them first. It gives one confidence. Cheerful confidence is a big asset in selling.

"Manners maketh man." It also maketh friends. Someone said that we make money out of our friends ; our enemies won't do business with us.

Manner depends on little things. To enter the office of a man you don't know with outstretched hand is liable to offend his sense of what's proper. He usually prefers to shake hand first.

Some travellers try to make sales over the phone with people they don't know. It sounds as if it would save time. It is more likely to produce resentment. It is forcing an interview on a busy man. Human nature resents being forced.

I make a point of not outstaying my welcome. Some business men like to talk on—I stay and listen. Others want you to conclude your business and then get out—I get out. It is well to watch for the little signs.

There are travellers who are proud of having sold a customer more than he can comfortably dispose of. I consider it poor policy. Goods are not really sold until they are in the hands of the consumer.

I don't run down rival firms. It would sound as if I were afraid of competition.

Above all, I know my goods. I have been through the factories where they are made. I know what they are good for, and why. That's more than selling points—it's service.—*Daily Telegraph.*

Bamboo Works—II.

(*Continued from Page* 7.)

Bamboo articles are easily made by anyone having a knowledge of the use of a saw, rasp, screwdriver, and chisel.

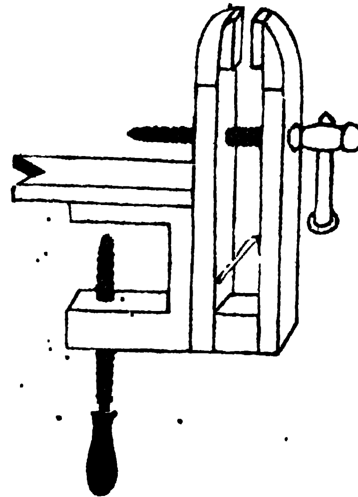
In bamboo work both tools and glue should be of the best quality and in good condition. A blunt bradawl will split the cane, a dull saw will fray it, and weak or cold glue will result in bad joints.

The tools required consist of hammer, pincers, screwdriver, tenon saw, bradawls, and, in short, of such wood working tools as are generally used, with the addition of a few special tools.

Rasps of sharper curve than ordinary ones are used for hollowing out the ends of bamboo canes, the curve could not be obtained by using a knife. Bamboo rasps are made in all sizes from ½ in. to 1¼ in. the most useful being ½ in. 3/4 in., and 1 in. A separate rasp is often used for each size cane, as it saves time, but a 1-in. rasp will do all the work necessary.

A brace and a supply of drills will be necessary, because every nail that is driven into bamboo must have hole made to receive it, or the bamboo will split. In many cases a long bradawl is suitable for making the hole, but often the brace and bit are necessary. The latter tools are also useful in cutting dowel or mortice holes in the canes ; the hole is begun by drilling, and the articles finished with the chisel, small file or knife.

A hand appliance is a wooden cramp and table with a vice fixed. as in Fig. 1. The cramp is fixed to any ordinary bench or table, and forms a convenient work table.



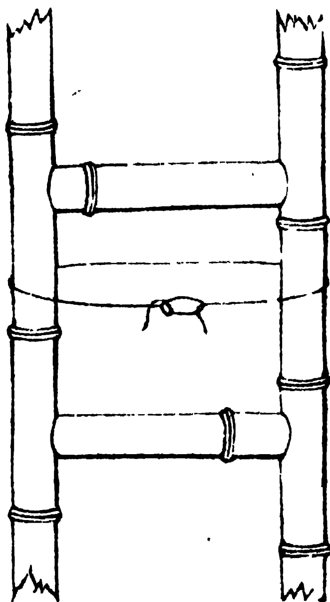
(FIG 1.)

A mitre block or a mitre box is necessary for making joints at right angles. The uneven bamboo may be rather difficult to hold true and steady on the block, but the difficulty is not so great in the mitre box, where the groove is of great assistance.

Clamps will be needed for holding together freshly glued and dowelled joints ; but a good substitute for a clamp can be formed with a piece of string. Fig. 2. The string is tied loosely round the pieces of bamboo to be held together, and then the string is tightened by twisting, a stick being inserted for this purpose. If the stick is made just short enough to revolve in the available space, the tightened string can be prevented from untwisting by gently pushing the stick through the strings, so that one of its ends rests on one of the bamboo crosspieces.

The tenon saw should have fine teeth, and should be kept well sharpened and set, the skin of bamboo being particularly hard.

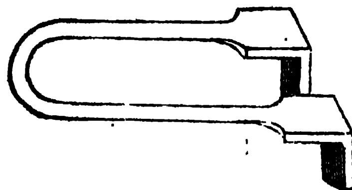
The other tools or appliances required are those for use in bending bamboo chiefly. Bamboos are built principally by heating them in a smokeless flame, the heat rendering them pliable, so that they can be bent without much difficulty, the shape given being retained when cold. Either a Bunsen burner, if gas is available, or a large spirit lamp should be obtained, though any device that gives a fairly large, but smokeless, flame is suitable. A plumber's benzoline blow lamp answers admirably. The Bunsen burner is best for heating, only the heat must not be concentrated too much to one part, but the burner kept continually on the move.



(FIG. 2.)

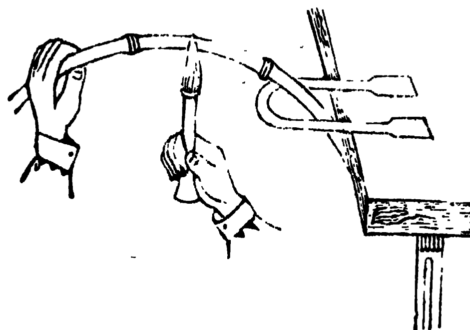
A substitute for a spirit lamp or Bunsen burner is a composite candle, well wrapped round with paper from top to bottom; this, when lighted, gives a good flame, although rather smoky.

The bending iron is made of 3/8 in. rod, the ends being flattened out, bent, and fixed in the bench or table as shown in. Fig 3. The iron loop measures 2 in. across the inside and is from 5 in. to 7 in. long, though the size may be increased or decreased according to the size of the bamboo to be bent.



(FIG. 3.)

To bend bamboo, pass the end of the cane through the loop of the bending iron and underneath the top of the table, and with the outside end of the cane in one hand and the heating appliance in the other bend the cane by a gentle downward pressure while the part of its surface that is to



(FIG. 4.)

form the inner curve is made hot by allowing the flame to play upon it as it is passed slowly up and down. Fig 4. Do not concentrate the heat but move the flame about so that the cane is not burnt when the cane is sufficiently pliable, a gentle pressure should be able to produce the required curve; then a wet cloth should be rubbed up and

down the cane until it is cold, keeping the cane in the bending iron and continuing the downward pressure. Canes that have been exposed very long to the weather or that are old, can seldom be bent satisactorily. Fresh new canes bend the best.

(To be Continued.)

Artificial Dyestuffs.

As Germany was the chief supplier of the coal tar dye stuffs and as their import has been stopped in view of the war, it would be interesting to learn how these dyestuffs are made.

Though the Germans are the masters in this industry, owing to their enormous capital and cheap and improved scientific methods of production, yet the artificial organic dyestuff industry originated in England in 1856. Though *mauve* a lilac colour, was obtained from lichens by Dr. Stenhouse in 1848, but it was not till 1856 that Sir W. A. Perkin (1837-1907) obtained it by direct oxidation of aniline containing toluidine. This was the starting point of the coaltar dyestuff industry. In 1859 Verguin made magenta, or fuchsine, and each following year other colours were discovered, until at the present time there are several thousand dyes on the market, and thus a stupendous industry has arisen in their manufacture. As the first dyes were made from aniline, the colours were known as "aniline dyes," a name still applied to them as a class, but they are more commonly called "coal tar dyestuffs." They are derived from various substances, most of which are derivatives of aromatic bodies, especially those of benzene, naphthalene and certain pyridine bases, particularly quinoline.

The coaltar colours may by conveniantly divided into the following groups (After Benedikt-knecht) :—

I. Aniline, or Amine dyes.
 (a) Rosaniline derivatives.
 (b) Safranines and Indulines.
 (c) Oxazines.
 (d) Thionines (sulphur compounds.)
 (e) Aniline black.
II. Phenol dyes.
 (a) Nitro bodies.
 (b) Nitroso bodies.
 (c) Phthaleines and Indophenols.
 (d) Rosolic acid.
III. Azo Dyes.
IV. Quinoline and acridine derivatives.
V, Anthracene dyes.
VI. Artificial Indigo.

I. The aniline or amine dyes include all those which contain derivatives of nitrogenous bases, excepting only the azo dyes.

(a) The rosaniline group contains derivatives of amido-triphenyl-methane. These substances are made from aniline or its homologues.

The most important dyes of this group are the following :—

Magenta, or *fuchsine* is made by oxidizing aniline containing toluidine with nitrobenzene ; formerly arsenic acid or mercuric chloride was used as the oxidizing agent.

Acid Magenta, or *fuchsine S*, is an alkali salt of the trisulphonic acid of ordinary magenta.

Methyl violet, or *Paris Violet*, is made by oxidizing dimethyl-aniline with copper chloride.

Methyl green is formed from methyl violet by the action of methyl chloride.

Benzaldehyde green, or *Malachite green* is made by heating dimethyl aniline with benzaldehyde in the presence of fused zinc chloride.

Auramine is a yellow dye made by treating dimethyl-aniline with phosgene, and heating the product to 150°C. with ammonium chloride and zinc chloride.

(b) *Safranine* is made by oxidizing a mixture of para-phenylenediamine and toluidine.

Magdala red (*naphthalene red*) is made by heating amido-azo-naphthalene with the hydrochloride of *A*—naphthylamine.

Mauvein (*mave*) is made by oxidizing aniline containing toluidine, with chromic acid.

Induline (*Indigo, substitute, fast blue*) is made by heating amido-azo-benzene with aniline.

Nigrosine is a bluish gray dye made by heating aniline-chlorhydrate with nitrophenol.

(c) Oxazines.

Cotton blue is prepared by treating *B*-naphthol with nitroso dimethyl-aniline hydrochloride.

Gallocyanine is made by treating gallic or tannic acid with nitroso-dimethyl-aniline hydrochloride.

Nile blue is made by the action of nitrosodimethyl meta-amidophenol on *A*-naphthylamine.

(d) Thionines are dyes containing sulphur. The most important dye of this group is *methylene blue*, made by treating nitroso dimethyl-aniline with hydrogen sulphide, and oxidizing with ferric chloride.

II. The Phenol Dyes.

(a) Nitro dyes are, for the most part, yellow dyes having a strong acid character.

Picric acid is obtained by dropping carbolic acid into fuming nitric acid. Add 10 grammes phenol slowly to 10 grammes conc. nitric acid. When the action is over add 30 grammes of fuming nitric acid and boil for some minutes. Extract tne picric acid by means of hot water. It forms yellow, scaly crystals, and is used in silk and wool dyeing. Its alkali salts are explosive.

Victoria yellow is made by treating para-toluidine, or paracresol, with nitric acid.

Napthol yellow S. is made by nitrating *a*-napthol trisulphonic acid.

Anrantia is made by nitrating diphenylamine or methyl-diphenyl amine. The commercial dye is the ammonium salt.

(b) Nitrosobodies.

Resorcin blue is the ammonium salt of tetrabromresornfin. Resorcin is treated with nitrous acid to form nitro resorcin, which combines with more resorcin in the presence of sulphuric acid to from resorufin. This is then treated with bromine.

(c) Phthaleius are produced from phathalic acid or its anhyoride by combining with phenols.

Phenol-phthalein is produced by heating phenol with phthalic acid.

Fluorescein is formed by heating together resorcinol and phthalic acid to 200°. The sodium salt of fluorescein is the dyestuff *uranin*.

Eosins are the halogen derivates of flourescein; the *eosin yellow shade*, or *eosin G*, is the sodium salt of tetrabrom fluorescein; *eosin B*, or *Ery hrosin* is formed by treating fluorescein with bromine, and then with potassium carbonate; *rose Bengale* is the telra iodo-dicplor-fluorescein; *ph'oxin* is the tetra-bromdichlor fluorescein.

Rhodamine is made by heating phthalic acid with diethyl meta-amidophenol

Gallein is the phthalein of pyrogallol, and when heated with strong sulphuric acid forms the olive green dye called *Cœ ul in*, belonging to the azodyes. It is very fast when used with a chromium mordant.

Indophonol is made by oxidizing a phenol and dimine, particularly *A* naphthol and dimethyl para-phenylene-diamine It yields shades resembling indigo on cotton and wool, and may be reduced by glucose and Caustic Soda to a colourless *indophenol-white*, which oxidizes in the air to again from the blue; hence it is much used in indigo-vats to brighten and cheapen the vat indigo colours.

(d) Rosolic Acids are made from rosaniline or para rosaniline by treating with sodium nitrite, and then boiling with sulphuric acid. This forms *rosolic acid*, or *aurin*, which are red dyes of unstable character.

(*To be Continued.*)

The Cashew Tree.

(ANACARDIUM OCCIDENTALE.)

It seems but right that a little time should be devoted to the Cashew Tree now that it is fast assuming commercial importance as a result of the increasing demand for its edible nut in the foreign market. It is not the purpose of this paper to enquire into or set forth the possibilities of the rising industry or offer suggestions for its improvement or expansion. This may perhaps be deferred till after the return of normal times when a more detailed study of technical side of the industry could also be made. Of a comparatively recent birth and confined to a very limited area of the country it has not escaped the blow which the present adverse conditions have dealt to export trade in general. The impetus, however, derived from the past sustained demand for the product has resulted in the cultivation of the neglected tree on a considerable scale. The available land adjoining private holdings has been planted ensuring a produce which ought in due course suffice the market. The buyers depend at present on scattered plantations and straggling trees which find themselves in private compounds and which are for the most part of spontaneous growth.

As its vernacular name implies the cashew is an exotic first imported into Malabar by the Portuguese. It has now extended to all the western maritime districts of Southern India where it is to be found growing more or less plentifully on the hill-slopes facing the sea and not far from its shores. It is to be particularly met within South Canara which is by far the largest exporter of the nut being as it is the seat of two or three European firms which handle annually as many as 1600 tons of the product. Being a native of the West Indies and used to an insular climate it seems to hug the sea cost and dwindles away towards the interior. It seldom grows to a large size, 25 or 30 feet being the greatest height that rare specimens in shady surroundings are known to have attained but throws out its lateral branches in horizontal tiers which drooping impart to the tree the form of an enormous bush easily distinguishable by its bright coloured foliage. The leaves are oval in shape, leathery to the touch and whitish yellow in colour with clearly marked veins.

They are found by the villagers to serve admirably the purpose of a toothbrush as well as tooth powder. The acrid pungent principle of the leaf is supposed to have a tonic effect on the gums, a belief which is amply bourne out by facts. It will be admitted on all hands that the villagers who use the natural dentifrice named above possess and retain a healthier set of teeth than the townspeople do inspite of their a using costler tooth powders with which the market is veritably flooded.

The cashew tree is of a hardy semi-wild type depending entirely on the Nature, a mother kind alike to all and needing no more human attention than the tired passing way-farer is pleased to bestow on it. It bears a pear shaped juicy fruit which is valued solely for the sake of the nut which it carries at one end of it. The fruit itself does not find much favour even with animals of the lowest grade of creation to whom its acrid taste proves far from tempting. The kidney-shaped nuts consist of a hard outer shell enclosing a similarly shaped kernel sheathed in a brittle skin. The

kernels raw or roasted possess a bland pleasant oily taste not unlike that of walnuts but far inferior as regards nourishing virtues. The earliest known use of the nut was for flavouring Madiera wine. The inventive faculty of the latter-day confectioner has found many a new use for the nut so that it freely finds its way into cakes and sweets as a substitute for almonds and like nuts. The kernel divested of its repulsive oil is largely employed in enriching confectionery which however, will not betray the presence of the usurper to the ordinary palate. The nuts are mostly exported to France, Germany, and the United States of America where scientific machinery has been invented and is employed to express the oil and so clarify and disguise it as to pass for the luxurious salad, apple, or sweet oil. The outer shells of the nuts also contain a heavy oil which is supposed to possess powerful caustic properties but owing to its offensive acrid nature it is never likely to grow popular with the physician. As a vesicating agent it has few equals.

The fruit is in season during the first three months of the year when the nuts are gathered, roasted and supplied to the exporting firms which in their turn expose them to the sun for a couple of days or two peel, garble and pack them in dealwood boxes for shipment. The frequent complaints of the consignees about the rancid state in which the contents of the cases reached them inspite of the careful curing ellicited a searching enquiry into the methods employed by the natives for roasting the nuts and resulted in the discovery that they were treated with water at a certain stage of the roasting process inorder to facilitate the removal of the karnels from the burnt shells. It may be added that broken kernels find no sale. Not until a more satisfactory methods is devised for roasting can the danger in transit be prevented. The export of the nut in its whole raw state ought to absorb a heavy freight rendering the trade far from profitable in its returns.

The tree yields a dark brown wood which is of little or no value in carpentry though it is eagerly sought for by the keen tile manufacturer. The use of the wood in backing the tiles is supposed to impart to them that bright red colour so much priced by the inexperienced buyer. The tree besides exudes an astringent gun which does not compare favourably with the gum arabic. Hardy though the tree be it lives but a short life.

If there is an indigenous product the waste of which is regretted by the Indian it is the cashew fruit from which a spirit can be distilled possessing approved diuretic properties. When procurable it was administered in advanced cases of cholera when the patient developed symptoms of the retention of urine. Before and long after the inaction of the Abkary laws the liquor was distilled by every villeger who could procure the fruit in sufficient quantities. Despite the vigilance of the preventive staff occasional cases of illicit distillation are still reported from out of the way villages which goes to prove if proof were necessary that the popular faith in the beneficial effects of the stimulant is still unsaken. The question of the farming out of the right of distilling the liquor is believed to be before the Government whose decision is eagerly awaited. As an answer to the alleged opposition of the foreign liquor dealers it may be stated that the quantity produced will be for some years to come too small to perceptibly affect the vested interests of the licensees.

M. M. PERIS.

The Manufacture of Needles.—III.

(Concluded from Page. 57.)

EYEING.

The method of eyeing the needles by punching the eyes and gutters in the middle of the double wire, is the most expeditious and economical, and where practicable, is generally adopted. By this method the wires in their successive stages present the following appearance :—1. The straight wire pointed at both ends. 2. The same wire flattened out in the centre, with the impression of the eye and gutter. 3. The same wire with the eye perforated. The bur produced on each side of the eye in the process of stamping, has now to be filed off, but as this would be a slow process if performed on the wires separately, a number of them are collected together by a very ingenious process ; they are *spitted* on fine wires, wire being run through each line of eyes. This work is performed by children with great rapidity. The bur is then removed with a flat file, after which the separation tokes placd by bending the needles backwards and forwards between the two spits, thus producing two separate rows of needles, each row spitted on a wire. The points of each row are then grasped in a kind of hand-vice, and the heads filed to the proper shape. The needles are now of the proper length, although still in the rough state, but they are so far advance as to have an eye, a gutter, and a point.

In the process of stamping and spitting and separating the needles, some of them become bent ; they now go to the *soft straightener* ; that is, being still in the soft state they are made straight by rolling on a flat steel plate, with a smooth steel file, turned up at each end so as to present a convex surface, with which the work is performed. A number of needles being put on the plate parallel to each other, the straightener, generally a woman, taking them one by one, gives them a few turns backwards and forwards, by which rolling between hard unyielding surfaces they become straight. One woman can straighten a thousand needles in an hour.

HARDENING.

The needles are still black, dingy, and soft, and therefore quite unfit to ply their busy task, guided by nimble fingers. They have now to be *hardened*, for which purpose they are spread, by means of two little trowels, in a thickish layer on narrow plates of iron, and placed on a shelf in the furnace. Here they are brought to a red heat, and are then taken out and suddenly cooled by being plunged into cold water or oil. The effect of this operation is to make them very hard and brittle, but they are too much so for use, and require to be made less so by the process of *tempering* : that is, when taken out of the water and dried, they are again heated, but not by any means to so high a temperature as in the former case, and are allowed to cool gradually. For this purpose they are placed on an iron plate heated by a fire beneath, and are kept in constant motion for about five minutes with small iron shovels : the moment a film of blue oxide forms upon them the needles are considered to be of the proper temper, and are instantly removed from the plate.

In hardening the needles by plunging them into cold water, they all become more

or less bent: they are therefore submitted to *hard* or *hammer straightening*, which is generally done at the homes of the work-people. The needles are rolled by the finger on a smooth steel slab, and the touch, hesisted by sight, instantly detects such as do not roll truly; these are picked out, placed on a small anvil, and tapped with a small hammer, whereby they are effectually straightened.

SCOURING.

Next comes the important process of *scouring* or *cleaning*. As the wires were made straight in the first instance by mutual attrition, so by a similar operation they are made bright. For this purpose they are made up in bundles of forty or fifty thousand by the following contrivance. A number of strings are put across a wooden tray open at the two ends; upon these strings is plac'd a piece of stout canvass, and within the canvass the needless are arranged in heaps in the direction of their length, but without any distinction as to heads and points. A small quantity of emery, oil, and soft soap being sprinkled over them, they are rolled up into a bundle, and tied up temporarily. The bundle can then be lifted up without danger of the needles falling out. The man then takes a piece of strong twine and winds it laboriously round the bundle, in a tolerably close coil, removing the string as he advances with the twine, so as to from a compact bundle two or three feet long and about three or four inches thick. A number of such rolls being prepared, they are put under the scouring machines which consist of an arrangement of troughs containing weighted slabs or rubbers, under which the bundles of needles are moved backwards and forwards in the same way as the rollers of a common mangle. The rubbers make twenty or thirty movements in a minute, pressing heavily on the rolls, and causing the needles to rub over and over each other, so that by constant friction during fifty or sixty hours, aided by oil, emery, soft-soap, and polishing putty, a bright surface is obtained. The rubbing is not continued for more than eight hours at a time; for the constant friction wears out the canvas in which they are folded, and the roll requires remaking. The needles are therefore unpacked, washed in soap and water, again tied up with the addition of polishing putty and oil, and rubbed for another eight hours. This is repeated every day for seven or eight days for the best needles. This is rough usage for so slender and brittle an instrument as a needle, and the breakage is often considerable. Of course, the more rubbing the greater is the amount of breakage, but the needles improve considerably in appearance and quality by this scouring, which would seem to impart something more than polish, and to exert a sort of annealing effect on the needles.

"HEADING."

The needles are now bright and clean in appearance, but by no means finished. They are sent from the scouring room to the *bright-soap*, where by a peculiar shaking motion in long tin trays, they are all brought parallel. They are then made up into long rows or heaps, and are passed to a little girl called the *header*, whose business it is to turn all the heads one way. To do this to forty or fifty thousand needles would seem a difficult and endless task, and yet it is accomplished with a degree of rapidity exactness which creates astonishment, and

by a process so simple that it excites a smile. The child has a piece of rag or soft leather wrapped round the fore finger of the right hand, which she presses against the pile of needles, and of course all the points which happen to lie that way run into the rag, and retain sufficient hold to admit of their being lifted up and dragged out of the pile; and thus, being supported at the heads by a finger of the other hand, they are ranged in a fresh pile, so that when the work is complete, the lot of needles is arranged into two piles, with the points opposed to each other.

At this stage of the proceedings the needles are again examined, and all broken and defective ones removed.

DRILLING.

Next comes the delicate and important operation of *drilling* the eyes, or in other words, removing from each eye the sharp edges, which in inferior needles cut the thread and waste the time of the sempstress To effect this it is necessary further to temper the needle, at and about the eye, so that it may be soft enough to be cut by a drill. This is done by placing the needles on a steel slab, with their heads projecting over the edge; a red hot plate is then cautiously brought near to them, and the moment they begin to feel the heat they change colour, passing through various shades of yellow and purple until they assume a dark blue colour, which shows the proper temper for working.

The drills are small three sided instruments of steel, three or four inches long, and are prepared with the nicest care. The drilling is performed by young women, seated at a bench opposite a window, with the tiny drills revolving with great speed before them. The constrained attitude of the drillers is very remarkable, and almost painful to look at, the eye rigidly fixed and held at some distance, as if for long sight, while every muscle of the body is apparently rigid to prevent tremor or unsteadiness of hand. The driller, taking up a few needles by the points in the left hand, spreads them out like a fan, and brings them opposite the point of the drill, which is managed with the right hand; by a peculiar motion of the thumb and fingers of the left hand, the eyes are successively brought under the action of the drill. First, each eye is "counter-sunk, that is, it is bevelled off with the drill so as to join the gutter by a rounded instead of a sharp edge. The drill is then passed round the rest of the edge of the eye, taking off its sharp edge, and making it like the bow of a pair of scissors. Both sides of the eye are operated on in this manner.

This drilling is a modern invention, an is a real improvement, as the drilled needles are little if at all liable to cut the thread and they rarely break in the eye, because they must be made of the best material, and be blued or softened to allow the dril to cut; hence they are not so brittle as the common needles, which are not drilled.

Gold eyed needles are produced by dipping the head of the needle in ether containing gold in solution, which immediately attaches itself to the steal when dipped in. This is a refinement which serves only to increase the cost of the article without adding to its utility.

After the needles are drilled, the points are finished on a small hone-stone, mounted in a lathe, and revolving with great rapidity. The needles are then passed to the polisher, who polishes them on wheels of wood cover-

ed with buff leather, slightly smeared with a polishing paste.

The needles are now ready for papering. They are counted into quarters of hundreds, which are folded up in blue papers and labelled. These packets are then made up into bundles of twenty papers each, and these again into square *packets*, containing twenty, forty, or sixty thousand needles, which, if intended for exportation, are packed in soldered tin cases.

The processes, as above described, apply only to the fine sorts of needles ; some of the finishing processes are omitted for the coarser sorts.

World's Sugar Supply.

STATE AND PROSPECTS.

Ever since the war began sugar, from an industrial and commercial view-point, has gone from bad to worse. The advance in prices for current delivery is not so serious a matter as the question of eventual supply, yet it is difficult to deny a grave importance to the advance in a leading type of good sugar such as Tate's cubes from 17s. 6d. per cwt. to 31s. A corresponding appreciation in inferior qualities is perhaps even more far-reaching in its influence, for the consumption of the coarser types is by far the larger, and involves many "manufactured" and "artificial" products wherein the "man in the street" does not suspect sugar. The main cause of the present dearness is directly statistical. When stocks which on New Year's Day showed a relative surplus of over 100,000 tons are found on May 1 to be deficient by 20,000 tons the market is bound to take precautions.

Obviously it could not be possible for an entire revolution in our sources of supply to occur without any great disturbance. When such a revolution was accompanied by a very material shortage of the total quantities available the balance of supply and demand tended to be gravely upset. The equipoise, or something towards equipoise, is usually supplied in such cases by a consequent reduction in the consumption of the article but in full face of the discouraging condition consumption of sugar has actually increased.

For the first four months of the present year the Home consumption of sugar came out at 596,509 tons, against 504,924 tons for the corresponding period last year. It will be perceived that the increase is something like 18 per cent., and therefore very appreciable. The total imports of all kinds of sugar for the period came out at 540,041 tons, and the figures indicate how the increased consumption caused a shrinkage of stocks. The refined imported amounted to 194,034 tons, against 282,455 tons for the same period last year. That, of course, tells a tale, and shows how English refiners increased their output, consequent on receiving 131,000 tons less of Continental beet sugar, a diminution the direct and immediate outcome of the war. Beyond 43,000 tons contributed by Holland, we had virtually no Continental beet sugar coming in Germany and Austria-Hungary, whence ordinarily we drew nigh on the million and a quarter tons, are no longer possible sources of supply ; Belgium under the German heel, Russia blockaded, and France, never a very large shipper, had full home use for all the beet sugar produced at Home. Thus Great Britain has had to depend mainly on cane sugar for current wants.

The Government was aware of this consequence on war from the week of its breaking out, and took prompt and commendable action. But for its free purchasing of Java and Mauritius sugar a famine of a very serious character must have soon set in on the sugar market. Cane sugar since August has been regaining the original ascendency. The beet-sugar production of the Central European countries, some 3,750,000 tons, must have been to a great extent, wasted, and the need of human food of more direct application is leading as we write to enormous planting of potatoes on the land which, but for the war, would be sown, also at this date, with sugar beet seed. France, the producer of 900,000 tons, in a good year, is admitted to have only 300,000 tons, and in addition to the 60,000 tons which her colonies are able to send us has to make other provision. How much will be needed is not yet known, but the French Government, with the admirable frankness which it has shown in all matters since the war, acknowledges that the total may be considerable.

Russia is credited with a beet-sugar crop of two million tons, and the forcing of the Dardanelles is, therefore, not wholly a corn-trade question. The Archangel outlet, however, which from June 1 will be playing a rather important role in the corn trade, will not help Mincing Lane. The sugar is produced in the provinces most remote from Archangel, and consignment to the White Sea port would involve a railway freight quite prohibitive of profit. Europe, in a word, has lost its commercial supremacy in the sugar trade, and the sceptre has returned to the old tropical producers of cane sugar. The state of affairs in France is in one respect alarming. Returns for May 1 show that only 69 factories are now at work, as compared with 206 a year ago. The French Government was bound to take cognisance of this fact, and is now admittedly a large buyer of raw sugar in the cane-sugar islands and regions. The circumstance of France entering the arena as a competitive buyer against the United Kingdom is undoubtedly a matter bound to exert an appreciable influence on June prices.

The Mediterranean countries, other than Southern France, do not find sugar an economic crop, their good land being required for vines, fruit, and other more intensive agriculture, thus Italy and Spain are in the field as sugar buyers; and the additional requirements of Greece, Tunis, Tripoli, Algeria, Morocco, and Portugal, though in no one case large, make up between them a total worthy of a Great Power. Turkey, where sugary foods are the one universal luxury, will probably contrive one way or another to import the delicacy, and while Egyptian production has been carefully fostered by English administrators, it is still below the consumption. The latter has increased per head through the prosperity induced by the English Administration.

It will not be until September that Italy, Spain, and Southern France can secure the sugar beet now being sown, and meanwhile the run of 1914 cane sugar is unprecedented, The running out of stocks must necessarily, and indeed automatically, put a premium on the coming new crop supplies. The Indian sugar crop now estimated at 2,315,000 tons, as compared with 2,291 000 tons for the previous season, will not raise the total yield to any level of interest to an importing country like the United Kingdom. for India

requires fully 2,250,000 tons for Home use. A well-informed correspondent is of opinion that Australia is in a position greatly to develop its production of sugar, but, interesting as such development would be, it does not come within our present purview It has yet to be accomplished. Mincing Lane, for the nonce, is looking rather to South America, Cuba, Mexico, the Malay countries and islands, and S. E. Asia for any chance available surpluses.

The outlook for the users of sugar is undoubtedly serious. But it has to be faced. The "irresistible magnet" of high prices—and futures are a good deal above spot values—may do something to ease the situation by drawing forth unsuspected reserves. We hear that British Guiana has greatly increased its area of land devoted to cane sugar. Coloured labour is forthcoming, and it is fully expected that our South American possession will become an appreciable factor in the sugar trade of the future.

The very important question of beet-sugar production in Great Britain and Ireland cannot now be considered. The agricultural interest is practically unanimous in complaining that the Government before the war prevented the cultivation of the sweet root as a field crop It is now too late to start factories, and therefore it is little good sowing the seed, though round the one existing factory, that in Norfolk increased sowings of sugar-beet are already indicated. But any dearness in sugar between now and a new season should be the strongest of inducements for Parliament to insist on a more generous treatment of a British industry. But for a fiscal policy of the most serious type—a species of inverted protection, a protection of the overseas producer—the British consumer would now have a substantial quantity of home-grown beet sugar, upon which to draw in a day of any real need. One word more The total production of the sugar-yielding world is approximately 18 million tons. The countries at war mean the loss of 5½ millions to the purchasing States. Clearly this must result in a real stringency of supply, and care will be needed lest there should come therewith serious inflation of value.—*The Statist.*

Small Trades & Recipes.

REMEDY FOR SCABIES, ITCHES, ETC.

Sublimed Sulphur	2 drs
Balsam Peru	2 drs
Paraffin Mollis	16 ozs

Mix and make an ointment. Wash the affected parts with carbolic soap and water and apply the above.

REMEDY FOR ANOREXIA.

Tinchere of gentian, Tincture of quassia, Tincture of Columba, Tincture of anise, of each 75 minims. Mix. For loss of appetite this mixture has been found of distinct value The dose is 20 to 40 drops in a quarter of a glass of water, twenty minute before meals.

HAIR DEPILATORY.

Thallium acetate	0·3 grams
Zinc oxide	2 grams
Vaseline	20 grams
Lanoline	5 grams
Rose water	5 grams

Mix and apply the above mixture. Let it remain for a few minutes, remove with a blunt knife and wash off the paste.

SURGICAL SOAP.

Best commercial Soap	3 pints
25% Alcohol	1 pint
Glycerine	1 pint
Water	1 pint
Oil of Rose Geranium	1 dr.

Mix. Recommended as a detergent for the hands previous to operation.

SNUFF FOR COLDS.

Menthol	6 grains
Boric Acid	2 drams
Bismuth Subcarbonate	3 "
Pulv. Benzoin	3 "
Sodium bicarbonate	20 grs
Magnesium Carbonate	50 grs
Powdered orris-root	2 ozs

Mix and use as snuff.

INDIGENOUS GUTTA PERCHA.

It is generally known that the mudar or akanda, *Calotropis gigantea, R. Br.*, affords a very valuable kind of hemp or flax. The flowers are used by Hindu worshippers. The cotton is also utilized. A very valuable charcoal can be obtained from the dried stems. But can't you prepare gutta percha from the juice or sap of the shrub? As the shrub is found in abundance all over India, a vast quantity of guttapercha can be prepared. Here is a field for small industrialists. An article on the subject may appear.

VARNISH FOR UMBRELLAS.

Boil 3 parts of turpentine and one of pulverized litharge in 2 or 3 of linseed oil. This is applied with a brush and dried in the sun.

BLACK PARCEL SEALING WAX.

Black rosin, 24 parts; Beeswax, 2 parts; lampblack, 6 parts. Melt the rosin and wax, then thoroughly incorporate the lampblack with them and cast into moulds

SILVERING POWDER.

Silver Chloride	2 parts
Potash Bitart	14 "
Sodii Chloride	10 "

Mix and keep in blue phials. Moisten a little of the powder with water; apply a piece of rag rubbed on the clean surface of the metal to be silvered and finally polish it by rubbing briskly with a piece of cotton upon which pptd. chalk is dusted. It would be better to cleanse the articles at first before applying the silvering powder.

BLACKING FOR HARNESS.

Treacle	8 ozs.
Lampback	1 oz.
Sweet Oil	1 oz.
Gum arabic	1 oz.
Isinglass	1 oz.
Water	32 ozs.

Mix and heat on a water bath. When cold add one ounce of spirits of wine. If it gets hard place the bottle in warm water for a short while before using.

LEMON CAKES,

Put 2 spoonfuls of rose or orange flower water to the whites of 10 eggs, beat them an hour with a whisk; then put in a pound of beaten and sifted sugar, and grate in the rind of a lemon. When well mixed, add the juice of half a lemon, and the yolks of 10 eggs, beaten smooth. Stir in 3/4 lb. of

flour: butter a pan, and bake it in a moderate heat over for an hour. Orange cakes may be made in the same way.

TO PROTECT WALLS.

To protect stone and brick walls from moisture brush the wall over with a hot solution of 3 lbs of white Castile Soap in 4 gallons of water; let it dry for 48 hours and then apply a solution of 2 lbs. of alum in 16 gallons of water.

Scientific & Industrial Topics.

To Preserve Rubber.

Michailowsky states that sprinkling with naphthaline keeps rubber tubing in a glass jar in good condition for 3 years and that this method is available for all kinds of soft rubber goods.

Hair Depilatory.

The *Canadian Lancet* recommends the following:—A mixture of 4 drams each of starch and barium Sulphide and 2 drams of zinc oxide is a good depilatory. Mix with a little water in a watch glass, and apply to the part to be denuded. Remove after two minutes, when the hair will usually have disappeared.

A new rapid Method of Estimating urea in Urine.

Mr. E. K. Marshall, Jr., gives the following process in a recent issue of the *Journal of Biological Chemistry*:—The method consists in incubating a portion of urine with an aqueous extract of Soybean flour, all the urea being thereby transformed into ammonium carbonate through the action of an euzme existing in the Soy bean. To prepare the extract, 25 gm. of Soybean powder are mixed with 240 c.c. of distilled water and allowed to stand an hour; 25 cc. N10HCl are then added, allowing the mixture to stand a few minutes longer. This precipitates most of the protein, which is then removed by filtration. A few drops of toluene are added to the filtrate as a preservative. The urea determination is as follows: Two 5 c.c. portions of urine are measured into flasks of 200-300 c.c. Capacity and diluted with distilled water to 100 125 c.c. Two c.c. of euzme solution are added to one flask, a few drops of toluene to each, and the solution allowed to remain well stoppered at room temperature overnight. The fluid in each flask is titrated to a distinct pink colour with N10HCl using methyl orange as an indicator. The amount of HCl required for the urine and enzynee solution, less than the amount used for the urine alone and the amount (which must have been previously detained) required to similarly tritate the enzynee solution corresponds to the urea present in the urine. One c.c. N10HCl corresponds to o. 6 gm. per litre of urea in the urine. The error of the method is under 2 per cent.

By the by, Mr. H. E. Annett, Agricultural chemist to the Govt. of Bengal have shown that *Makham Sim* or sword bean (*canavalia ensiformis*) contains a similar enzynee or ferment like that in Soy bean which can rapidly change urea into ammonium salts and hence the same can also be used in determining urea in urine or blood. His researches on this subject is embodied in an article, "The urease content of certain Indian seeds," which he has

communicated to the Biochemical Journal, London.

A substitute for Leather.

The cotton or linen cloth called "moleskin" is used for the purpose, both sides of it being coated with a compound obtained by mixing 100 parts of drying oil, 3 of burnt ember, and 6 of lampblack, and liquefying the mixture with oil of turpentine. When dry the cloth is passed between smoothing rollers. Several layers of this mixture may be applied, and when the last layer is dry the cloth is coated with a varnish consisting of the same ingredients as above, but a larger quantity of oil of turpentine. When this is dry, the surface is polished with pumice stone, and finally coated with a varnish consisting of linseed oil, 100 parts, litharge, umber, and Berlin-blue, each 2 parts, and caoutchone, 2 parts. The cloth is finally dried for 48 to 60 hours, at a temperature of 120 °F.

A New Lubricant.

Writing on the uses of graphite as a lubricant the *Commercial America* says that, for several years Edward G. Acheson, the inventor of artificial graphite, has been experimenting with graphite to reduce it to a from more suitable for lubrication in connection with oil than the graphite of commerce. He has at last succeeded in producing a from of graphite which is so finely divided that it is almost reduced to separate molecules.

This effect is secured by adding to the graphite a dilute solution of gallotannio acid obtained from straw. This gives what is called unctuous graphite which is easy to handle, but which is quickly precipitated after mixture with oil or water.

When this graphite is mixed with a combination of water and a little gallotannic acid to which a few drops of ammonia are added, the result is a black liquid which does not settle out and from which the graphite is not removed even by the finest quality of filter paper. The graphite can, however, be separated from the water by adding hydro-chloric acid and then filtering it.

By numerous experiments Mr. Acheson has been able to separate the finely divided or defloculated graphite from water and recombine it with oil, thus giving a lubricant which can be used in thin form in place of the heavy pressures. When mixed with water the defloculated graphite can be used as a lubricant for engine cylinders, giving an ideal effect for high temperature and high pressure steam.

"Neogen"

An alloy, resembling silver, called "Neogen," has been discovered and announced in a foreign scientific paper, It consists of 58 per cent. of copper. 27 of zinc, 12 of nickel, 2 of tin, and of aluminium and bismuth, each 0.5 per cent. The last two metals give the alloy a silvery appearance and a capacity for retaining polish.

Industry Buyers & Sellers' Guide.

(199) Supdt. of Industries, Banganapalle.—Wants to buy rolled gold beads.

(206) R. S. Venkataramana Iyer, 30, Agraharam, Shevapet, Salem.—Wants buyers, in Jubbulpur, Nagpur, and neighbouring towns, of best seamless quilts, bedcases, pillow and cushion cases, bedsheets, towels, Etc 6¼ % commission is allowed, A sample case may be obtained for Rs. 2-4.

(211) C. V. Seshagiri Row & Sons, 182, Sunthapett, Nellore.—Wants to buy "Monogram" medium gas engine cylinder oil and "Polarine" gas engine oil.

(214) *G. N.*, Chittoor—Desires to correspond with reliable firms and manufacturers who wish to introduce their goods into America and he is willing to be their agent in America to which country he is proceeding by the end of October 1915 where he will stay for not less than four years. While in America, he is willing to offer his services in any capicity, such as trade correspondent or a purchasing agent, for a decent remuneration. Some of the goods which find a ready sale in America are :—Indian Chutneys, Condiments, Curry-powders, pulwas, carpets and prints, Indian Shawls, art goods, ivory and other curious, silver and gold filigree work, and other Indian things which a distinction of their own.

(215) Vora & Co., Rajkot.—Wants the services of an expert who can make sugar from jaggery. State age, qualification, salary expected, and practical experience.

The Electro Homœopathic Dispensary, Humpankutta, P O. Mangalore,—invites application for Homæopathic Medicines, Tissue Remedies, Electro Homæopathic Medicines, Fr. Muller's Specifics and Luyties Specialities.

Formulas, Processes, Answers, Etc.

Fire Clay and Firebrick.

Head Master, Trichur, writes: What is fire clay and how fire bricks are made?

Fireclays are natural earths and are almost infusible. They are generally found underlying coalbeds. In composition they are kaolins, containing a considerable amount of free silica, as quarts. They may contain a little more iron than good China clay, but are free from alkalies. The following is the analysis of Ohio fire clay :—

SiO_2	74.93
Al_2O_3	17.19
Fe_2O_3	0.79
CaO	0.29
MgO	0.46
Alkalies	1,61
H_2O	5.44
	100.71

Fire brick are made from fireclay, with the addition of a large amount of "grog" or silica. These bricks must resist great heat, and not shrink nor warp. The clay is prepared similarly to that for common brick, but more care is taken in the mixing. The bricks are also heavily pressed to give them density. The burning is at the highest temperature possible, so that no shrinkage will occur latter when the bricks are in use. They are brittle, and must be supported by a backing of common hard brick. Fire brick are also made of highly basic, or of acid material, in order to better withstand the action of fluxes.

How to make Chloroform.

M. L. S., Ajmeer, writes : Will you kindly state how to make chloroform ? What is it ? What are its properties ?

Unless you are well versed in practical chemistry, you can't prepare it. Its preparation is dangerous. You are advised to buy the same from any wholesale chemists' shop. If you can't, you may prepare it as follows:

Chloroform, Trichlormethane, Terchloride of Formyl, or Dichlorinated methylic-chloride, $CHCl_3$, is a clear colourless, volatile liquid, which refracts light strongly, with sp. gr. of 1.525 at 0 C., and vapour density 1.491. It boils at 60·16°C. (Regnault,) and solidifies at 70 C. It has an agreeable, ethereal odour, a slightly acrid and intensely sweet taste, is miscible in all proportions with absolute alcohol but is only slightly soluble in water (one in less than 200,) in pure ether, and in fixed and volatile oils, Though not ordinarily inflammable, it burns with a green flame when thrown upon hot coals, or if a light be applied to a mixture of it with not less than about 30% of alcohol. It does not mix with glycerine. It is a solvent of mastic and most resins, many alkaloids, iodine, bromine, camphor, and of phosphorus and sulphur sparingly. It also dissolves gutta percha and india rubber. It acts on india rubber even when vulcanized. It was discovered in 1831 by Guthrie in America, and by Soubeiran in France. Liebig independently discovered it in the following year, but in 1834 its true constitution was established by Dumas. In 1848 Dr. J. Y. Simpson of Edinburgh first introduced the employment of pure chloroform as an anæsthetic into surgical practice.

Chloroform is prepared in a great variety of ways :—(1) by the action of alkalies on chloral (2) by boiling trichloracetic acid with aqueous solutions of the alkalies ; (3) by replacement of an atom of chlorine in carbon tetrachloride, CCl_4, by nascent hydrogen ; (4) on the large scale for commercial purposes by the action of bleaching powder on ethylic alcohol and other carbon compounds. It is now largely prepared by the action of chlorinated lime on acetone, as well as from both methylic and duty-paid alcohol. About 8 lbs. of slaked lime, and 80 lbs of the strongest chloride of lime, and 22 gallons of water at a temp. of 80°—90°C. are introduced into a leaden vessel or wooden cask, and thoroughly mixed. 2 lbs. of alcohol are then poured in · and if the heat evolved in the ensuing reaction is not sufficient to distil over the chloroform, a current of steam is passed into the vessel. The crude distillate is purified by washing with water and agitation with sulphuric acid, and by redistillation, finally, with a small quantity of slaked lime and calcium chloride, by means of a water bath. Pictet's process for purifying chloroform consists of fractional crystallisation and distillation under reduced pressure at a low temperature. The chief impurities to which chloroform is liable are ether, alcohol, aldehyde, hydrochloric, hypochlorous, and sulphuric acids, chloral, and heavy volatile oils. Chloroform is a somewhat unstable substance, decomposing under the influence of light and air and yielding chlorine, hydrochloric acid, and the dangerous gas Carbonyl chloride or phosgene, $COCl_2$; the addition of one per cent. of alcohol is sufficient to check this change if kept cool, away from light, and in full stoppered non-actinic glass bottles. If

shaken with 1/10 its volume of sulphuric acid for 20 minutes, neither the acid nor the chloroform should be more than faintly tinged, nor should the acid, if separated and diluted with 3 volumes of water, develop more colour or disagreeable odour. On further dilution with 5 volumes of water, this liquid should still remain transparent and colourless, and the addition of silver nitrate solution to it or to water which has been shaken with the separated chloroform, should cause no further opalescence. It leaves no residue or unpleasant odour during or after spontaneous evaporation. If chloroform be shaken with twice its volume of distilled water, the latter should not redden litums ; with solution of silver nitrate or baryta water it should cause no turbidity ; nor should zinc iodide and starch paper be coloured by its vapour, the liberation of iodine indicating decomposition and the presence of chlorinous compounds. Of these, carbonyl chloride is unaffected by shaking with mercury, which combines with free chlorine. The preservative action of alcohol probably depends upon its combination with the decomposition products of the chloroform, thus preventing their exercising a catalytic, accelerating influenence on the decomposition. The addition of 1/4 per cent. by weight of alcohol to chloroform produces sp. gr. 1·497, but if more be added it makes the sp. gr. too low to guarantee its original purity,—if 1 percent. be added the sp. gr. is reduced to 1.4854. The presence of chloroform can be detected by adding the liquid to be tasted for it a monamine, such as aniline, and an alcoholic solution of caustic potash, when the characteristic odour of the carbamines is given off at once, or on the application of heat.

How to Preserve fish

Govt. Contractor, Benares, writes : I shall be obliged if you kindly inform me if there is any process for preserving fish for 48 hours in a fresh condition so as to facilitate the fish trade from a distant place.

Have you tried any of the processes which have already appeared from time to time in our previous issues ! If so, which one and with what results ? However, the following extracts from the report on Fishery Work done in Bengal during the year ending 30th June, 1914, by Mr. T. Southwell, A. R. C S., F. L. S., F. Z. S., M. R. A. S., Dy Director of Fisheries, Bengal, will be of much interest :—"With a view to testing, in India, the efficacy of Captain Solling's patent paper for preserving fish during transportation, and in order to ascertain whether or not it is practically feasible to introduce it with advantage among the fish dealers in general, an experiment was made at Goalundo during August 1913 in treating *Hilsa* and other fish according to Capt. Solling's process. The chief points to be observed in this method of packing fish are that the fish should be gutted immediately it is caught, and the gills and intestines removed at once. The fish is then split, if necessary, and washed thoroughly clean, and then wrapped in Capt. Solling's paper and placed in ice. There are certain other minor details to be attended to in packing the fish, but these need not be elaborated here. For purposes of comparison, the fishes were packed under similar conditions in the following way :—

I. Ungutted fish —

(a) As caught,

(b) In Ice.

(c) In Solling's paper.
(d) In Ice and Solling's paper.
II. Fish gutted the moment it was caught—
(a) As gutted.
(b) In Ice only.
(c) In Solling's paper,
(d) In ice and Solling's paper.

Three sets of experiments on the lines indicated above were carried out in temperatures varying between 80°F., and 91°F., and observations were taken in each case. The results are summarised below :—

I.	Ungutted fish	Kept good for from
(a)	As caught	13 to 18 hours
(b)	In Ice	83 to 88 „
(c)	In Solling's paper alone	14 to 18 „
(d)	In Ice & Solling's paper	92 to 99 „
II.	Fish gutted the moment it was caught—	Kept good for from
(a)	As gutted	15 to 20 hours
(b)	Ice only	108 to 113 „
(c)	In Solling's paper	16 to 20 „
(d)	In Ice & Solling's paper	111 to 125 „

It will therefore be seen from the above statement that Capt. Solling's process of packing fish does not appear to possess marked advantage over the ordinary method of packing fish in ice, especially considering the trouble, labour and cost entailed in its execution. Consignments of fish differently treated, in ice, according to Capt. Solling's process were sent to the Director of Agriculture, Bihar and Orrissa, at Ranchi, who arrainged for the fish to be distributed, for opinion, among European officials as well as among certain of the Indian population there. As to the taste and flavour of the fish, there was a consensus of opinion that Solling's paper gives results superior to those of ordinary packing in ice. But the general public are not very keen regarding delicacy of taste and the like when they can get equally good fish in all other respects at a cheaper rate" Now, our readers are requested to judge for themselves as to the merits and demerits of the process. Information regarding Capt. Solling's paper and the methods of its use can be obtained from the Director of Agriculture, Bengal, Calcutta.

Brief Queries & Replies.

(67) R. K. A., Beawar.—The books to suit you are the set of Perfumery by Piesse, Rs. 7 14, and II and III vols. of Lunge's Theoretical and Practical Treatise on the mfr. of sulphuric acid and alkali, Rs. 63. Have you tried the various processes of purifying oils which have already appeared in our previous volumes ?

(77) Dawson, Periyakulam.—Communicate with S. C. Mukherjee & Co., 39/2, Canning St., Calcutta, for stationary articles,

(124) P. S M., Calcutta.—The address you want is Pratti Kamayyachetty Clerk, Ganjam Dist. Court, Berhampore.

(122) R. C., Goudal.—You can communicate with our chemist for learning Hydropathy or chromopathy by correspondence for a small fee.

(159) M L. H., Bikaneer.—Why not make articles of papermachie ?

(157) N. H, Old Sora.—Sajji-Mati is not fuller's earth, but barilla, a crude carbonate of Soda.

(196) J. S. N. N, Trichinopoly.—Various articles on soap manufacture and the addresses of machinery sellers have already appeared in our previous volumes.

(198) Roll No. 672, Bombay.—Consult a lawyer and also the books on patents the names of which have appeared in our previous volume.

(200) V. V. M, Akola.—See a reply No 129 above.

(202) R. K. K., Bogra.—An article on button making and another on pearls will appear. Write to Thakurchand and Hotchand Bros., Sukkur, Sind, for the machinery. We do not know whether country

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